DENSO

2D Code Handy Scanner

AT27Q-SB

User's Manual

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Preface

Thank you for using the AT27Q DENSO WAVE 2D code Handy Scanner.

Please READ through this manual carefully. It will enable you to operate your scanner correctly.

After you have finished reading this manual, keep it handy for speedy reference.

Note: Do not use this scanner in an environment with electrical noise that can trigger malfunction.

Note: Specifications described in this manual are supported by AT27Q Firmware version 1.00 or later.

- DENSO WAVE INCORPORATED does not assume any product liability arising out of, or in connection with, the application or use of any product, circuit, or application described herein.
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Customer Registration and Inquiries

Customer Registration

To allow us to provide our customers with comprehensive service and support, we request that all customers complete a Member Registration Form. Registered members will be offered the following privileges.

- Latest upgrade information
- Free exhibition and event information for new products
- Free web-information service "QBdirect"

QBdirect Service Contents

Information search service (FAQ)	Offers detailed information on each product.
Download service	Offers downloads of repair modules for the latest AT27Q Series systems or software, and sample programs.
E-mail inquiries	Allows customers to send product-related queries by e-mail.

Please note that these privileges may be subject to change without prior notice.

How to Register

Access the URL below and follow the instructions provided.

http://www.qbdirect.net

SAFETY PRECAUTIONS

Be sure to observe all these safety precautions.

- Please READ through these instructions carefully. They will enable you to use the scanner correctly.
- Always keep this manual nearby for speedy reference.

Strict observance of these warnings and cautions is a MUST for preventing accidents that could result in bodily injury and substantial property damage. Make sure you fully understand all definitions of these terms and symbols given below before you proceed to the text itself.

⚠ **WARNING**	Alerts you to those conditions that could cause serious bodily injury or death if the instructions are not followed correctly.
⚠ **CAUTION**	Alerts you to those conditions that could cause minor bodily injury or substantial property damage if the instructions are not followed correctly.

Meaning of Symbols

A triangle (△) with a picture inside alerts you to a warning of danger. Here you see the warning for electrical shock.

A diagonal line through a circle (⃠) warns you of something you should not do; it may or may not have a picture inside. Here you see a screwdriver inside the circle, meaning that you should not disassemble.

A black circle (●) with a picture inside alerts you to something you MUST do. This example shows that you MUST unplug the power cord.

⚠ WARNING

To System Designers:

- When introducing the scanner in those systems that could affect human lives (e.g., medicines management system), develop applications carefully through redundancy and safety design which avoids the feasibility of affecting human lives even if a data error occurs.

Handling the battery cartridge

Wrong handling of the battery cartridge could result in a heat, smoke, explosion, or fire. Be sure to observe the following.

- Never disassemble or heat the battery cartridge, nor put it into fire or water; doing so could cause battery-rupture or leakage of battery fluid, resulting in a fire or bodily injury.
- Do not carry or store the battery cartridge together with metallic ballpoint pens, necklaces, coins, hairpins, etc.

  Doing so could short-circuit the terminal pins, causing the batteries to rupture or the battery fluid to leak, resulting in a fire or bodily injury.
- Never put the battery cartridge into a microwave oven or high-pressure container.

  Doing so could cause the batteries to break, generate heat, rupture or burn.
- Avoid dropping the battery cartridge or letting it undergo any shock or impact.

  Doing so could cause the batteries to break, generate heat, rupture or burn.
- Never charge the battery cartridge where any inflammable gases may be emitted; doing so could cause fire.
- If any abnormality is detected--smoking, abnormal odors, discoloration or deformation when the battery cartridge is in use, in storage or being charged, remove the battery cartridge from the scanner or charger.

- Only use the dedicated charger for charging the battery cartridge.

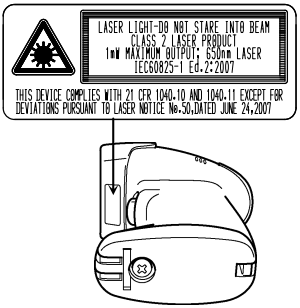
  Using a different type of charger could cause battery-rupture or leakage of battery fluid and result in a fire, bodily injury, or serious damage to property.
- The battery cartridge contains strong alkaline liquid (electrolyte).

  If battery liquid leaks from the battery cartridge and it gets into your eyes, rinse them with clean water thoroughly without rubbing and consult a doctor as soon as possible. Otherwise, you may damage your eyes.

⚠ WARNING

Handling the scanner

Wrong handling of the battery cartridge could result in a heat, smoke, explosion, or fire. Be sure to observe the following

<table>
<tr><td rowspan="2"> </td><td>• The scanner uses a laser light for indicating the scanning range. The intensity of laser light might be too low to inflict bodily injury. However, do not stare into beam.
The scanner complies with IEC 60825-1 Ed.2:2007.
In accordance with Clause 5 and 6, IEC 60825-1, the following information is provided to the user:
LASER LIGHT
DO NOT STARE INTO BEAM
CLASS 2 LASER PRODUCT</td><td>  </td></tr>
<tr><td colspan="2">Caution – Use of controls or adjustments or performance of procedures other than those specified herein may result in hazardous laser light exposure.</td></tr>
<tr><td rowspan="2"> </td><td colspan="2">• If smoke, abnormal odors or noises come from the scanner, immediately remove the battery cartridge and contact your nearest dealer.
Failure to do so could cause fire or electrical shock.
• If foreign material or water gets into the scanner, immediately remove the battery cartridge and contact your nearest dealer.
Failure to do so could cause fire or electrical shock.
• If you drop the scanner so as to affect the operation or damage its housing, remove the battery cartridge and contact your nearest dealer.
Failure to do so could cause fire or electrical shock.
• Do not use the scanner where any inflammable gases may be emitted.
Doing so could cause fire.
• Do not subject the scanning window of the scanner to direct sunlight for extended periods.
Doing so could damage the scanner, resulting in a fire.
• Never bring any metals into contact with the terminals in connectors.
Doing so could produce a large current through the scanner, resulting in heat or fire, as well as damage to the scanner.
• Stop charging if it cannot be completed within the specified time.
• Never put the scanner into a microwave oven or high-pressure container.
Doing so could cause the batteries to break, generate heat, rupture or burn.</td></tr>
<tr><td colspan="2">• Never use the scanner on the line voltage other than the specified level.
Doing so could cause the charger to break or burn.</td></tr>
<tr><td> </td><td colspan="2">• Use the dedicated battery cartridge only.
Failure to do so could result in fire.</td></tr>
</table>

⚠ CAUTION

Handling the scanner

Wrong handling of the battery cartridge could result in a heat, smoke, explosion, or fire. Be sure to observe the following

Never disassemble

- Never disassemble or modify the scanner; doing so could result in an accident such as break or fire.

  Doing so could result in a fire or electrical shock.

- If you are not using the scanner for a long time, be sure to remove the battery cartridge for safety. Failure to do so could result in a fire.

- Do not put the scanner on an unstable or inclined plane.

  The scanner may drop, creating injuries.

- Never put the scanner in places where there are excessively high temperatures, such as inside closed-up automobiles, or in places exposed to direct sunlight.

  Doing so could affect the housing or parts, resulting in a fire.

- Avoid using the scanner in extremely humid areas, or where there are drastic temperature changes.

  Moisture will get into the scanner, resulting in malfunction, fire or electrical shock.

- Do not place the scanner anyplace where it may be subjected to oily smoke or steam, e.g., near a cooking range or humidifier.

  Doing so could result in a fire or electrical shock.

- Never cover or wrap up the scanner in a cloth or blanket.

  Doing so could cause the unit to heat up inside, deforming its housing, resulting in a fire.

  Always use the scanner in a well-ventilated area.

- Do not insert or drop foreign materials such as metals or anything inflammable through the openings (vents or scanning window) into the scanner.

  Doing so could result in a fire or electrical shock.

- Do not scratch or modify the scanner.

  Doing so could damage the scanner, creating a fire hazard.

- Do not put heavy material on the scanner, or allow the scanner to get pressed under heavy material.

- Do not look into the light source from the scanning window or do not point the scanning window at other people's eyes.

  Eyesight may be damaged by direct exposure to this light.

- Do not use the scanner if your hands are wet or damp.

  Doing so could result in an electrical shock.

⚠ CAUTION

Handling the scanner

Wrong handling of the battery cartridge could result in a heat, smoke, explosion, or fire. Be sure to observe the following

	• Never use chemicals or organic solvents such as benzene and thinner to clean the housing. Do not apply insecticide to the scanner. Doing so could result in a marred or cracked housing, electrical shock or fire. • Do not use the scanner with anti-slip gloves containing plasticizer. The scanner housing may be broken, creating injuries, electrical shock, or fire.
	• When taking care of the scanner, remove the battery cartridge. Failure to do so could result in an electrical shock. • Do not drop the scanner. The housing may be broken, creating injuries. Using the scanner whose housing is broken could result in smoke or fire. Remove the battery cartridge from the scanner. Then contact your nearest dealer.

Components Required

The scanner (AT27Q-SB) requires the following components that differ depending upon whether the communications adapter is used and which interface is selected.

■ When using the communications adapter (BA11/10-RKU)

Basic components

The table below lists the basic components required for the use of the communications adapter.

(1) Scanner	AT27Q-SB	
(2) Communications adapter	BA11/10-RKU	
(3) Charger	CH-AT10L	
(4) AC adapter	AD2-1005/3000	For charger

Components required for individual interfaces

- For RS-232C interface

(5) RS-232C interface cable	CBBA-RS2000/9	
(6) AC adapter	AD2-1005/3000	For communications adapter

- For RS-232C interface and communications adapter mounted in the charger

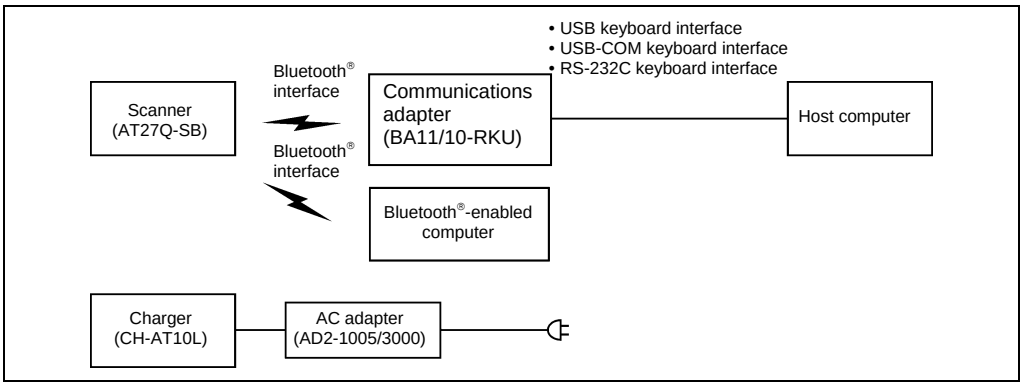
(5) RS-232C interface cable, Charger built-in type	CBBA-RS2000/9-1	

- For USB keyboard or USB-COM interface

(5) USB interface cable	CBBA-US2000/4	

■ When directly communicating with Bluetooth-enabled equipment (no BA11/10-RKU communications adapter is used)

(1) Scanner	AT27Q-SB	
(2) Charger	CH-AT10L	
(3) AC adapter	AD2-1005/3000	For charger



Bluetooth® Wireless Communication Link

The scanner AT27Q-SB uses Bluetooth® wireless networking technology.

Item	Specifications
Standard	Bluetooth® Specification Ver. 2.1+EDR
Radio output	Class 2 (maximum 2.5 mW)
Profile(s) supported	SPP (Serial Port Profile), HID (Human Interface Device Profile)
Communications range (reference value*1)	Max. 10 m, with no obstructions

*1 This value is for wireless networking between the scanner and the BA11/10-RKU communications adapter. The communications range varies with the equipment used and the operating environment.

Wireless networking requires a stable radio environment. Not all operating environments provide this. In particular, note that

- Using the scanner in close proximity to other wireless LAN equipment operating in the same frequency band (2.4 GHz) risks radio interference that can reduce throughput or even entirely block wireless networking.
- Microwave ovens, industrial heating equipment, high-frequency medical equipment, and other equipment using the 2.4 GHz band can sometimes block wireless networking.
- Electromagnetic noise from computers, refrigerators, and other home appliances can sometimes block wireless networking.
- The following environments can sometimes block wireless networking.
  - Metal objects or particles in the vicinity
  - Metal walls around the area
  - Excessive vibration
- The communications range of 10 m given above is merely a reference value assuming a clear line of sight. Reliable wireless networking is by no means guaranteed at 10 m for all combinations of equipment used and operating environments. Some combinations might even work for greater distances, but be sure to confirm that the scanner link operates properly before introducing the link operation.

NOTE: To System Designers:

- Before developing applications, make sure that the intended environment is free of the interference factors above and thus actually capable of supporting link operation.
- When introducing the scanner into an environment where equipment using radio waves in the 2.4 GHz band operates or when introducing such equipment after the introduction of the scanner, be sure to confirm that the scanner radio link operates properly with all equipment being in operation beforehand.
- If the environment of the radio communications system is changed after the introduction (e.g., newly installed household appliances and movement/addition of shelves or objects), then confirm that the radio link operates properly again before the actual use.

Care and Maintenance

■ Proper Care of the reading window

Dust or dirt accumulating on the clear plate of the code reading window will affect reading performance. If you use the scanner in dusty areas, therefore, periodically check the clear plate and clean it if dusty.

- To clean the plate, first blow the dust away with an airbrush. Then wipe the plate with a cotton swab or the similar soft one gently.
- If sand or hard particles have accumulated, never rub the plate; doing so will scratch or damage it. Blow the particles away with an airbrush or a soft brush.

■ Proper Care of the Scanner body

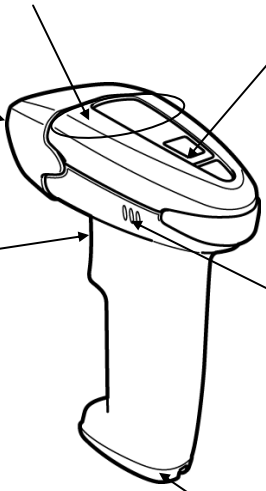
Wipe any dirt from the Scanner body with a dry, soft cloth.

Note

• Never use substances such as benzene or alcohol, as this may cause the housing to be marred or paint to peel off.

• If excessively dirty, wipe a soft cloth that has been soaked in soapy water (always use neutral detergent) and wrung out thoroughly.

Chapter 1 Names and Functions



Built-in antenna

Bluetooth® antenna.

Do not modify this antenna section or cover it by hand.

Indicator LED

Illuminates in blue when the scanner has read a code successfully.

Refer to Section 7.2 for details.
If any error occurs, this LED flashes in red.

Reading window

Bring this window to a code to be scanned.

Trigger switch

Press this switch to read data or initiate a Bluetooth® wireless link.

The following read modes are available to match the needs of the intended application.

- Auto-off mode
- Momentary switching mode
- Momentary switching mode (Reverse Type)
- Alternate switching mode
- Continuous reading mode 1
- Continuous reading mode 2
- Auto sensing mode
- Auto stand mode

(The factory default setting is auto-off mode.)
Refer to Chapter 5 for details.

- The Bluetooth® wireless link is disconnected by holding down the trigger switch. (Bluetooth® wireless link disconnection is set to enable when shipped from the factory.)

Beep hole

The beeper sounds when the scanner has read a code successfully.

Battery cover

Remove this cover to replace the battery cartridge.

Chapter 2 Bluetooth® Interface

For terms relating to Bluetooth® wireless communication in this manual, refer to Appendix 3 "Bluetooth® Glossary."

2.1 Enabling Bluetooth® Interface

Using the scanner for the first time requires scanning the "Start setting" and "Start operation" QR Code symbols given in Section 12.2 with the procedure in Section 12.1. Using the scanner when the "End operation" is selected requires scanning the "Start operation" QR Code symbol. Scanning those code symbols enables the Bluetooth® interface.

Note: Always disable this scanner's Bluetooth® interface in hospitals, aircraft, and other environments where the Bluetooth® radio waves (2400 to 2483.5 MHz, maximum 2.5 mW) present a potential safety risk.

This scanner interprets the "End operation" QR Code symbol as a command to disable the Bluetooth® interface.

Note: When the scanner leaves the factory or it has scanned the "End operation" QR Code(in Section 13.2), it no longer reads codes except the "Start operation" QR code, the " batch-process" QR code, and the barcode on the reverse side of the Communications adapter (BA11/10-RKU).

2.2 Establishing Bluetooth® Wireless Link

After enabling the Bluetooth® interface, establish a Bluetooth® wireless link between the scanner and the BA11/10-RKU communications adapter (or some other Bluetooth® equipment) using the following procedures. Both devices have slave as their default configuration.

The scanner can configure itself as both a slave (default) and master. To configure it as a slave, use the QR-coded parameter menu or configuration software (ScannerSetting_2D)*; to configure it as a master, it is necessary to specify the slave's Bluetooth® address to the scanner.

Tip: In addition to "As a master" and "As a slave" parameters, the configuration software provides a choice of "No slave/master configuration change" (see page 68) that prevents the Bluetooth® wireless link from getting broken when you change other parameters with the configuration software or batch-process QR Code symbols (see Chapter 4).

Scanner as Slave (default)

The scanner is a slave by default. This slave can establish a Bluetooth® wireless link with the BA11/10-RKU communications adapter (or some other Bluetooth® equipment) as a master without special communication procedures.

(1) If the scanner is currently a master, use the scanner to read the "Configure as slave" QR Code symbol given in Section 12.2 using the procedure in Section 12.1 to switch it to slave operation.

(2) Wait for the scanner to beep three times, press the scanner's trigger switch, and wait approximately two minutes (default) for the master device to connect to this slave.

(3) Configure the communications adapter (or some other Bluetooth® equipment) as a master and specify the scanner's Bluetooth® address.

For the communications adapter, use the configuration software (BASetting). (For other Bluetooth® equipment, use the procedures set forth in the user's manual.)

(4) Wait for the communications adapter (or some other Bluetooth® equipment) to establish a Bluetooth® wireless link with the scanner as a slave.

(5) Wait for the scanner to beep twice and the indicator LED to turn green (for 0.5 second), indicating a successful connection.

Note: If the master device cannot discover the scanner available in the vicinity, set the longer inquiry time and let the master device search it again.

Note: In response to the connection request from the master device, the scanner unconditionally connects to it. No Bluetooth® passkey is required to specify.

* The configuration software (ScannerSetting_2D) is available as free downloads from our website at http://www.denso-wave.com/.

Scanner as Master

To configure the scanner as a master and the communications adapter (or some other Bluetooth® equipment) as a slave, follow the sample procedures given below and specify the slave's Bluetooth® address to the scanner. The connection ratio of the scanner and slave device should be 1:1.

Using the communications adapter (example)

(1) Use the scanner to read the bar code (communications adapter's Bluetooth® address) on the back of the communications adapter.

(2) Wait for the scanner to configure itself as a master and establish a Bluetooth® wireless link with the communications adapter.

(3) Wait for the scanner to beep twice and the indicator LED to turn green (for 0.5 second).

Using some other Bluetooth® device (example)

(1) Confirm the device's Bluetooth® address.

For the instructions on how to confirm, see the user's manual.

(2) With the configuration software (ScannerSetting_2D)*, generate a "Bluetooth® address" code that specifies the equipment's Bluetooth® address to the scanner.

When using a commercially available code generator, generate it in the following format.

Code type	Data format
QR Code Model 1, 2	%% ADDRXXXXXXXXXXX %%
CODE 128 Code Set A	ADDRXXXXXXXXXXX

(Note) XXXXXXXXXXX should be a Bluetooth® address in hexadecimal.

Example: Bluetooth® address 000AF1234567

(3) Use the scanner to read the "Bluetooth® address" code.

(4) Wait for the scanner as a master to establish a Bluetooth® wireless link with the specified Bluetooth® device.

(5) Wait for the scanner to beep twice and the indicator LED to turn green (for 0.5 second), indicating a successful connection.

Note: The scanner does not check the Bluetooth® passkey when connecting to the slave device. If the slave device is so set up that it asks for the Bluetooth® passkey, therefore, modify the slave's setting to unconditionally connect to the master device, using the procedures set forth in the user's manual.

When connecting the scanner with an iPhone or iPad.

Follow the procedures below when connecting the scanner with an iPhone or iPad.

When using the operator's guide (included with the scanner).

(1) Turn the connected device ON to switch on the Bluetooth® function.

(2) Set the scanner communication settings.

Allows the scanner to scan "iOS(iPhone,iPad)"QR Code at Easy connection setup, QR-coded Parameter Menu. Wait for the scanner to beep three times to complete the settings.

(3) Press the trigger switch of the scanner and wait for the connected device to be connected.

(4) Select the scanner from the connected device list and connect it to the device. The scanner beeps twice if successfully connected.

(5) The next time connecting to the device, simply press the trigger switch.

When using the setting software (ScannerSetting_2D)

(1) Select the SPP profile for the scanner and connect it to the communication adapter (BA11-RKU) or the host computer equipped with the Bluetooth®.

(2) Change the scanner settings to "HID" for the interface, "SSP" for the security function, "Slave" for the mode, "Peripheral keyboard" for the local device ID of the setting software (ScannerSetting_2D).

(3) Select the scanner from the connected device list and connect it to the device. The scanner beeps twice if successfully connected.

(4) The next time connecting to the device, repeat the step (3).

2.3 Breaking Bluetooth® Wireless Links

Holding down the trigger switch for 5 seconds or scanning the "Break Bluetooth® wireless link" QR Code symbol forcibly breaks the scanner's Bluetooth® wireless link. (The QR Code symbol is given in Section 12.2 and its procedure in Section 12.1.)

Note: Breaking the Bluetooth® wireless link does not disable the Bluetooth® interface. To disable it, scan the "End operation" QR Code symbol.

2.4 Reestablishing Bluetooth® Wireless Links

When the scanner's Bluetooth® wireless link has been broken by any of the following events, pressing the trigger switch reestablishes the Bluetooth® wireless link. The scanner as a slave waits for a connection request from the master; the scanner as a master connects to a target slave.

- Scanning the "Break Bluetooth® wireless link" QR Code symbol (See Sections 12.1 and 12.2.)
- Holding down the trigger switch to break the Bluetooth® wireless link
- Modifying the scanner configuration with the configuration software (ScannerSetting_2D)
- "Reconnect request" dialog displayed by the configuration software (ScannerSetting_2D)
- Replacing the battery cartridge

2.5 Indication of Bluetooth® Wireless Link Status

The scanner's indicator LED and beeper together indicate the status of the scanner's Bluetooth® wireless link.

When the trigger switch is held down:

Indicator LED	Beeper	Scanner Status
Red, flashing	Silent	Reading is not possible when there is no Bluetooth® wireless link on enabling the link.
Red, flashing twice repeatedly		The scanner has scanned the "End operation" QR Code symbol.

When the trigger switch is pressed and released:

Indicator LED	Beeper	Scanner Status
Blue, flashing rapidly	Silent	The scanner, as a master, is searching for a connection target.
Blue, flashing slowly		The scanner, as a slave, is waiting for a master to connect.

When the Bluetooth® wireless link is established or broken:

Indicator LED	Beeper	Scanner Status
Green for 1 second	Two short beeps	The Bluetooth® wireless link is ready for use.
Red for 1 second	Long beep	The Bluetooth® wireless link no longer exists.

Chapter 3 Reading Codes

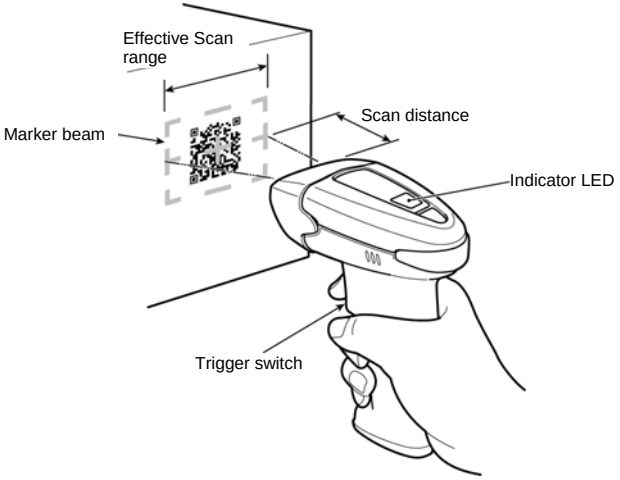
3.1 Before Use

Be sure to charge the battery cartridge loaded in the scanner with the dedicated charger before using the scanner for the first time or after an extended period of disuse. (For the charging procedure, refer to Chapter 9.)

3.2 Operation Procedure

(1) Bring the reading window to a target code and press the trigger switch. The marker beam comes on, indicating the scan range. Align the center of the marker beam with that of the target code.

(This step is not required for continuous reading modes 1, 2 and auto sensing mode.)



(2) Wait for the indicator LED to turn blue and the beeper to sound, indicating a successfully read.

Note: The actual scan range is narrower than the marker range. The scan range is approx. 6cm (2.4") wide by 4cm (1.6") high when the scanning distance is approx. 10cm (3.9").

Note: The marker range should only be used as a guide. It does not assure that a code within the marker range can be read.

Note: Allow only a single code to come within the field of view except when the multi-line code scanning is allowed. Having more than one code within the field of view either causes the read to fail or produces multiple input.

Note: The double-read prevention enabled time can be specified with the configuration software (ScannerSetting_2D).

Note: The scanner can read codes omnidirectionally. Note that a target code plus its margin should lie within the scan range.

Note: If the scanner fails to read due to specular effects or other factors, change the scanning angle of the reading window or the distance from the codes, and repeat the process. (Specular effects occur when the reflection of the light from the label surface is too strong, such as when the reflecting surface is polished or covered with vinyl.)

■ Scanning mode

Regular read mode	This mode transfers the code data when the scanner has read the code successfully.
Data verification mode	This mode verifies the code data against the master data stored in the scanner. (Refer to Section 6.1 for details.)

■ Switching to sleep mode for power saving

The scanner switches from standby to sleep mode to save power when the trigger switch is off in the auto-off or momentary switching mode or when the scanner is on standby in the alternate switching mode. (The scanner does not switch to the sleep mode in the continuous reading mode 1 or 2 or in the auto sensing mode.)

The transition period from standby to sleep mode is 30 seconds in the ordinary current mode. In the power saving mode (default), the scanner immediately switches to sleep mode. Only the configuration software (ScannerSetting_2D) provides a choice of these two modes.

The scanner in sleep mode takes more time (approx. 100 ms) to start and complete a sequence of scanning operation than the one on standby.

■ Auto power-off

If the scanner remains unused for the specified timeout period, it automatically shuts itself down. The timeout period can be specified within the range from 5 to 640 minutes in 5-minute increments by using the configuration software (ScannerSetting_2D). The configuration software can also disable this auto power-off feature.

■ Scanning with Bluetooth® wireless link broken

The scanner can read codes even with the Bluetooth® wireless link being broken. Use this scanning way when scanning codes is required but data transfer is not, for instance, when the scanner itself checks the verification result without transferring it to the host computer.

Scanning with Bluetooth® wireless link broken and that with Bluetooth® wireless link established can be switched only with the QR-coded parameter menu.

"Scan w/ Bluetooth® link broken" QR Code symbol	Allows the scanner to scan codes with the Bluetooth® wireless link being broken. Scanning the QR Code symbol also disables the Bluetooth® interface, making data transfer with the host computer impossible.
Cancel "Scan w/ Bluetooth® link broken" QR Code symbol	Cancels the "Scan w/ Bluetooth® link broken" setting. Scanning the QR Code symbol allows the scanner to scan codes with the Bluetooth® wireless link being established. It also enables the Bluetooth® interface, making data transfer with the host computer possible.

Note: The "Scan w/ Bluetooth® link broken" parameter retains its setting even the scanner reads the "End operation" and "Start operation" QR Code symbols in this order with the "Scan w/ Bluetooth® link broken" being selected. To cancel the setting, you need to scan the "Cancel "Scan w/ Bluetooth® link broken" QR Code symbol.

Chapter 4 Customizing the Scanner

You can customize the scanner by modifying communications, code type, and other scanner parameters with the QR-coded parameter menu or the configuration software ScannerSetting_2D*. These parameters retain their settings even when the power is off.

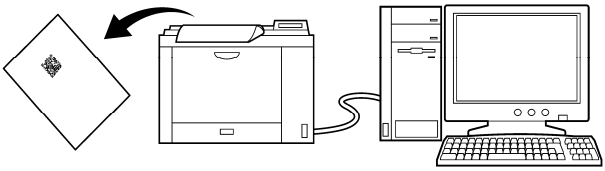
TIP: The scanner can hold not only its own parameter settings but also communications adapter parameter settings in its memory and customize the communications adapter via the Bluetooth® wireless link. There are two types of bar-coded parameter menus available for scanners (Section 12.2) and communications adapters (Section 13.2).

(1) Scanning parameter setting QR Code symbols in the **QR-coded parameter menu** by pressing the trigger switch.

(The QR-coded parameter menus for scanners and communications adapters are given in Chapters 12 and 13, respectively.)

(2) Using the **configuration software (ScannerSetting_2D)** in your computer. It is recommended that the scanner be configured as a master.

(This software also offers batch-process QR Code symbols for ready by scanners in the field.)



Note: Customizing the scanner with the configuration software or batch-process QR Code symbols breaks the Bluetooth® wireless link, so it is necessary to establish the link again after customizing. To prevent the Bluetooth® wireless link from getting broken, select the "No slave/master configuration change" parameter for the item "Configure the scanner as master or slave."

Note: When the "End operation" parameter is selected with the scanner, no parameter setting is possible. Prior to starting parameter setting, therefore, be sure to scan the "Start operation" QR Code symbol. See Chapter 2 for the "Start operation" and "End operation."

Note: When even the scanner is being charged, you can customize it with the configuration software except when the "End operation" parameter is selected.

Note: The configuration software is not available via HID (Human Interface Device) Profile.

* The configuration software (ScannerSetting_2D) is available as free downloads from our website at http://www.denso-wave.com/.

Chapter 5 Scanning Control

Two types of scanning controls are available--Trigger switch control and Software control.
Trigger switch control: Pressing the trigger switch readies the scanner for scanning. (Refer to Section 5.1.)
Software control: Instead of pressing the trigger switch, you send control commands from the host computer via the Bluetooth® interface to ready the scanner for scanning or put the scanner on standby. (Refer to Section 5.2.) The software control is not available via HID (Human Interface Device) Profile.
In addition, the auto sensing mode is also available. (Refer to Sections 5.3 and 5.4.)

5.1 Trigger Switch Control

Pressing the trigger switch turns on the illumination LEDs and readies the scanner for scanning. The scanner supports the following six trigger switch operating modes. Select the one that best meets your needs using the QR-coded parameter menu or the configuration software (ScannerSetting_2D).

(1) Auto-off mode

When the trigger switch is pressed, the scanner is brought to the Active state for approximately 5 seconds.

The scanner automatically returns to the Ready state when reading is successfully completed, or after approximately five seconds elapsed with the trigger switch pressed.

The scanner goes to the Ready state if the trigger switch is released before five seconds elapses. (in the case of normal mode)

When the Auto off mode is set to be active only once (One-shot mode), the time required for the scanner to become the Ready state after the trigger switch was pressed shall be designated in the setting.

(2) Momentary switching mode

The scanner is brought to the Active state only when the trigger switch is pressed, and returns to the Ready state when the trigger switch is released.

(3) Momentary switching mode (Reverse type)

The scanner is brought to the Ready state only when the trigger switch is pressed, and returns to the Active state when the trigger switch is released.

(4) Alternate switching mode

The scanner alternates between the Active state and the Ready state every time the trigger switch is pressed.

(5) Continuous reading mode 1

Establishing the Bluetooth® wireless link or selecting the "Scan w/ Bluetooth® link broken" parameter, the scanner lights the illumination LEDs and becomes ready to scan. The scanner ignores all trigger switch input.

If the scanner receives the Z, READOFF or LOFF command, it switches to standby; if it receives the R, READON or LON command, it becomes ready to scan.

You can select whether or not the scanner transmits the ERROR command when the scanner cannot complete reading and switches to standby, using the configuration software (ScannerSetting_2D).

(6) Continuous reading mode 2

This mode is functionally equivalent to the continuous reading mode 1, except that the scanner waits for a command upon completion of scanning. To become ready to scan, the scanner should receive the Z, READOFF or LOFF command to switch to standby and then receive the R, READON or LON command.

You can select whether or not the scanner transmits the ERROR command when the scanner cannot complete scanning and switches to standby, using the configuration software (ScannerSetting_2D).

Note: When you are setting parameters using the QR-coded parameter menu, the scanner is always in the auto-off mode regardless of the trigger switch operating mode selected.

Note: Establishing the Bluetooth® wireless link or selecting the "Scan w/ Bluetooth® link broken" parameter enables the trigger switch control.

5.2 Software Control

You can control the scanner by sending scanning control commands from the host computer via the Bluetooth® interface, instead of pressing the trigger switch.

Scanning control commands include R, READON, LON, Z, READOFF and LOFF and are restricted by the trigger switch operating modes, as listed below.

(√ : Command valid)

Commands	Description	Trigger switch operating modes				
		Auto-off mode	Momentary switching mode	Momentary switching mode (Reverse type)	Alternate switching mode	Continuous reading mode 1 or 2
R, READON, LON	Ready-to-scan commands Upon receipt of one of these commands, the scanner lights the illumination LEDs and becomes ready to scan.	--	--	--	--	√
Z, READOFF, LOFF	Standby commands Upon receipt of one of these commands, the scanner turns off the illumination LEDs and switches to standby.	--	--	--	--	√

Each of these commands should be enclosed with a header and terminator for transmission according to the communications conditions of the scanner.

5.3 Auto Sensing Mode--Automatic detection of labels

After establishing the Bluetooth® wireless link or selecting the "Scan w/ Bluetooth® link broken" parameter, in the Auto Sensing mode (Auto sense operation in Auto stand mode is included), bringing a code label within the scan range of the reading window turns on the illumination LEDs and starts the scanner reading the code. No trigger switch operation is required. Use this mode when the scanner is stationary to a stand and a code label is moved.

The illumination LEDs come on when you bring a code label within the designated range or move a code label within the same range. These LEDs turn off when a code label is moved away from the range or stays within the range without move for approx. 3 seconds.

In the Auto stand mode, after establishing the Bluetooth® wireless link or selecting the "Scan w/ Bluetooth® link broken" parameter, the scanner is set to the Auto sense operation when the power is turned on.

If the trigger switch is pressed while the scanner is operating in this mode, the scanner goes to the Auto off and reads a code whenever the trigger switch is pressed.

However, the scanner will automatically return to the Auto sense operation if the trigger switch is not pressed for longer than a time specified for the scanner to return to the Auto sense.

The time for the scanner to return to the Auto sense operation from the Auto off operation can be selected with the configuration software (ScannerSetting_2D).

Auto sensing mode and Auto stand mode are selected with the QR-coded parameter menu or the configuration software (Scanner Setting_2D).

The scanner offers a choice of three sensitivity levels for responding to codes. Switch to a higher sensitivity level if the illumination LEDs will not come on when a code is brought into the range, for example.

Note: Even if you do not bring a code label within the scan range, the illumination LEDs may come on when the ambient level of light changes or any shadows move within the scan range.

Note: To enable the scanner to work properly in auto sensing mode, an ambient illuminance of at least 500 lx is required.

Chapter 6 Scanning Functions

6.1 Data Verification Mode

The data verification mode verifies the code data read against the master data stored in the scanner and reports the match status with data output.

Data verification read is available in two types--"n-point verification" and "2-point verification," which can be selected with the configuration software (ScannerSetting_2D).

Selecting the n-point verification requires registering master data only one time for 1:n verification. The scanner verifies all code data read after registration against the master data.

The 2-point verification refers to 1:1 verification. Selecting it requires registering master data each time preceding code scanning. After registration of master data, the scanner reads a code, verifies the code data read against the master data and then becomes ready to register new master data. This way, the 2-point verification read alternately repeats master data registration and code scanning.

In n-point verification read, master data can be registered with "preset master registration" or "scan master registration"; in 2-point verification read, with "scan master registration" only. The preset master registration registers master data with the configuration software (ScannerSetting_2D) beforehand, and the scan master registration, by scanning a master code label.

The master data registered by "preset master registration" or "scan master registration" will be sent to the host computer when you scan the "Output master data" code given on page 16.

The verification parameters can be specified with the configuration software (ScannerSetting_2D).

6.1.1 Data verification read procedure

■ n-point verification

Preset master registration

This is available only when n-point verification is selected. Register the code type and data to be used for verification using the configuration software (ScannerSetting_2D). Up to 99 digits can be registered.

The registered master data will be preserved even if the scanner is turned off. To clear it, first clear the registered master data stored in the host computer with the configuration software (ScannerSetting_2D) and then send the new setting data to the scanner.

Scan master registration

1) Switch the scanner to the Data Verification mode.
2) Send a scan entry control command "E" from the host to the scanner. (Refer to Appendix 2 for control commands.) The indicator LED lights in green.
3) Use the scanner to scan a master code to be registered. (The scanner operates in the trigger switch operating mode currently set.) After registration of master data, the indicator LED turns blue and then goes OFF.
4) Use the scanner to scan a target code. The scanner verifies the code read against the master data registered and then outputs the result. After a successful read, the indicator LED lights in blue.

During the registration operation above, if the master data has fewer characters than specified (e.g., less than the specified verification start position), the registration operation aborts with an error.

Even if "Preset master registration" has been made, you can make "Scan master registration." If both have been made, the number of characters to verify that has been specified with "Preset master registration" and the master data that has been specified with "Scan master registration" will be valid.

Note: The registered master data will be cleared when you customize the scanner by modifying the parameters with the configuration software (ScannerSetting_2D) or a batch-process QR code symbol.

Note: If no master data has been entered by either "Preset master registration" or "Scan master registration," the indicator LED flashes in red, during which it is impossible to scan codes.

■ 2-point verification

Scan master registration

1) Switch the scanner to the data verification mode. The indicator LED lights in green.
2) Use the scanner to scan a master code to be registered. (The scanner operates in the trigger switch operating mode currently set.) After the registration of master data, the indicator LED turns blue and then goes OFF.
3) Use the scanner to scan a target code. The scanner verifies the code read against the master data registered and then outputs the result.

   After a successful read, the indicator LED lights in blue, indicating that the scanner is ready to register *new* master data.

During the registration procedure above, if the master data has fewer characters than specified (e.g., less than the specified verification start position), the registration operation aborts with an error. The scanner becomes ready to register master data again.

Verification retry after mismatch in 2-point verification

The 2-point verification read provides the "Verification retry after mismatch" option that retries verification against the *same* master data. Enabling this option with the configuration software (ScannerSetting_2D) readies the scanner not for registering *new* master data but for reading a bar code again if the verification result is a mismatch.

Disabling this option readies the scanner for registering *new* master data after bar code reading, no matter what the verification result is.

Note: Any of the following events clears the master data stored in the scanner.
- Turning the scanner power off.
- Modifying the verification start position or the number of characters to verify.
- Customizing the scanner by modifying the parameters with the configuration software (ScannerSetting_2D) or by scanning a batch-process OR code symbol.

Note: The data verification area can be selected from "Code type + code data" or "Code data only" with the configuration software (ScannerSetting_2D).

6.1.2 Specifying a verification object

You can specify two types of verification objects--data string and data block. For data string verification, specify the verification start position and the number of characters to be verified. For data block verification, specify one of the data blocks delimited by commas in the CSV format.

(1) Data string verification

The scanner verifies data specified by the verification start position and the number of characters to be verified against the master data registered in the scanner, and then it outputs the verification result.

The verification start position should be within the range of 1 to 999, and the number of characters* to be verified, within the range of 1 to 99.

*The number of characters for Code 39 and NW-7 symbols should be specified including start and stop codes.

In any of the following cases, the verification results in a mismatch:

1) The verification data in the specified position does not match the master data.
2) The code type which the verification data belongs to is different from the one which the master data belongs to. See **(Note)** below.
3) All data specified is not included or no data is included within the specified range.

(Examples)

Master data registered	Verification start position	No. of characters to be verified	Data string read (Verification object)	Result
345	3	3	00**345**	Match
345	3	3	00**345**678	Match
345	3	3	00**34**6	Mismatch
345	3	3	00**34**	Mismatch

(2) Data block verification

If data is saved in the comma-delimited CSV format, the scanner verifies data in the specified data block against the master data registered in the scanner, and then outputs the verification result.

The data block position should be within the range of 1 to 99.

In any of the following cases, the verification results in a mismatch:

1) The verification data in the specified block does not match the master data.
2) The code type which the verification data belongs to is different from the one which the master data belongs to. See **(Note)** below.
3) All data specified is not included or no data is included within the specified block.
4) The data block to be verified exceeds 99 characters in length.

(Examples)

Master data registered	Position of data block to be verified	Data block read (Verification object)	Result
345	3	0,12,**345**,6789	Match
345	3	0,12,**34**6,6789	Mismatch
345	3	0,12,**345**6,6789	Mismatch
345	3	0,12,**34**,6789	Mismatch
345	3	0,12	Mismatch

(Note) Whether the code ID mark is matched or not is determined not by the combination of code ID marks Type 1 and Type 2 but by Type 1 only (refer to Chapter 8, Section 8.2).

6.1.3 Verification result output

(1) Report of match/mismatch status

You can select any of the following report types using the configuration software (ScannerSetting_2D). Selecting "Disable transmission" reports nothing.

If there is a match:
Disable transmission.
Code data transmission.
OK transmission.

If there is a mismatch:
Disable transmission.
Code data transmission.
NG transmission.

(2) Beeper and indicator LED

You can check whether the verification result is a match or mismatch with the beeper and indicator LED.

When the beeper and indicator LED are enabled, they act as shown below in default setting.

		Beeper		Indicator LED
		Beeping times	Beeping tone	
2-point	If there is a match:	Emits a short 2 beeps.	Middle beeping tone	Lights in blue.
	If there is a mismatch:	Emits a long beep.	High beeping tone	Flashes in red.
n-point	If there is a match:	Emits a short 1 beep.	Middle beeping tone	Lights in blue.
	If there is a mismatch:	Emits a long beep.	Middle beeping tone	Flashes in red.

Output of the master data registered

Scanning the “Output master data” code given below lets the scanner output the verification section of master data entered in the Data verification read procedure, together with the code ID mark.

“Output master data” code

6.2 Editing Data

You can edit and output code data read, in any of the four data edit modes--"data extraction mode," "data substitution mode," "data blocksorting mode" and "ADF script mode." These data edit modes can be selected with the configuration software (ScannerSetting_2D). The default is "No editing."

Note: In the case of multi-line bar codes, unless all code ID marks read are matched, the data editing processing will result in an error regardless of whether or not the data read contains any error. Whether the code ID mark is matched is determined not by the combination of code ID marks but by Type 1 only (refer to Chapter 8, Section 8.2).

Note: In the case of split QR Code, the scanner in edit mode or batch edit mode performs data editing processing upon completion of scanning of all split code symbols; in non-edit mode, it performs each time a single split code symbol is read.

6.2.1 Data extraction mode

This mode offers three extraction choices--"data string," "data block" and "AI (Application Identifier)-prefixed string" extractions from code data read and then outputs it.

The "data block" extraction is available only when code data is in the comma-delimited CSV format. The "AI-prefixed string" extraction is available for GS1-128 (EAN-128), GS1 DataBar (RSS), and EAN.UCC Composite symbols (excluding linear components in a UPC/EAN Composite symbol).

6.2.1.1 Extracting a data string

The scanner extracts a data string specified by the "Extraction start position" and "Extraction end position" from a code specified by the "Code type" and then outputs it in the data transmission format selected in the scanner (see Chapter 8, Section 8.2). The extraction conditions and extraction start and end positions are listed below.

■ Extraction conditions

Extraction conditions	Choices
"Code type"	Any code
	QR Code
	iQR Code
	PDF417
	Data Matrix
	MaxiCode
	Aztec
	UPC-A/EAN-13
	UPC-E
	EAN-8
	Code 128
	GS1-128 (EAN-128)
	Codabar (NW-7)
	Code 39
	Code 93
	Interleaved 2of5 (ITF)
	Standard 2of5 (STF)
	GS1 DataBar (RSS)
	EAN.UCC Composite symbology
"Data transfer regardless of error result"	Permit/Prohibit

If the scanner fails to extract a data string or scans a code not specified by "Code type" when the "Data transfer regardless of error result" is permitted, then it outputs the data read as is without editing.

■ Extraction start and end positions

"Extraction start position"	"Extraction end position"
Head position	*n*th position
Tail position	
*n*th position	Tail position
	By *n* positions from the start position
	*n*th position

The *n* can be 1 through 9999. Note that if the extraction start position is specified as *n*th position, the extraction end position should be equal to or greater than the extraction start position.

Note: The number of characters for Code 39 and NW-7 symbols should be specified including start and stop codes.

Example Code read: QR Code, Data: 12345,
Header: STX, Terminator: ETX, Scanner ID: Disable, Code ID mark: Type 1,
Transmission of the number of digits: Enable, Prefix/Suffix: None, BCC: Disable

Extraction conditions	Extraction start position	Extraction end position	Output data
"Code type": QR Code "Data transfer regardless of error result": Prohibit	Head position	3rd position	[STX]Q0003123[ETX]
	Tail position	3rd position	[STX]Q0003345[ETX]
	1st position	Tail position	[STX]Q000512345[ETX]
	1st position	By 3 positions	[STX]Q0003123[ETX]
	2nd position	4th position	[STX]Q0003234[ETX]
	Head position	6th position	Error
	Tail position	6th position	Error
	6th position	Tail position	Error
	6th position	By 10 positions	Error
	1st position	6th position	Error
"Code type": QR Code "Data transfer regardless of error result": Permit	Head position	6th position	[STX]Q000512345[ETX]
	Tail position	6th position	[STX]Q000512345[ETX]
	6th position	Tail position	[STX]Q000512345[ETX]
	6th position	By 10 positions	[STX]Q000512345[ETX]
	1st position	6th position	[STX]Q000512345[ETX]
"Code type": PDF417 "Data transfer regardless of error result": Prohibit	Invalid if specified.	Invalid if specified.	Error
"Code type": PDF417 "Data transfer regardless of error result": Permit	Invalid if specified.	Invalid if specified.	[STX]Q000512345[ETX]

6.2.1.2 Extracting data blocks

If data read is in the comma-delimited CSV format, the scanner extracts data blocks specified by the data block numbers from a code specified by the "Code type" and then outputs it in the data transmission format selected in the scanner (see Chapter 8, Section 8.2). The extraction conditions and data bock numbers are listed below.

■ Extraction conditions

Extraction conditions	Choices
“Code type”	Any code
	QR Code
	iQR Code
	PDF417
	Data Matrix
	MaxiCode
	Aztec
	UPC-A/EAN-13
	UPC-E
	EAN-8
	Code 128
	GS1-128 (EAN-128)
	Codabar (NW-7)
	Code 39
	Code 93
	Interleaved 2of5 (ITF)
	Standard 2of5 (STF)
	GS1 DataBar (RSS)
	EAN.UCC Composite symbology
“Data transfer regardless of error result”	Permit/Prohibit

If the scanner fails to extract a data block or scans a code not specified by "Code type" when the "Data transfer regardless of error result" is permitted, then it outputs the data read as is without editing.

■ Data block numbers

Each data block number should be within the range from 1 through 99. Up to three blocks can be extracted.

Example Code read: QR Code, Data: (See the table below.)
Header: STX, Terminator: ETX, Scanner ID: Disable, Code ID mark: Disable,
Transmission of the number of digits: Disable, Prefix/Suffix: None, BCC: Disable

Extraction conditions	Data read	Data block numbers	Output data
"Code type": QR Code "Data transfer regardless of error result": Prohibit	1,23,456,7890	1, 2 and 3	[STX]1[ETX][STX]23[ETX][STX]456[ETX]
	1,23,456,7890	3, 1 and 2	[STX]456[ETX][STX]1[ETX][STX]23[ETX]
	1234567890	1	[STX]1234567890[ETX]
	1,,23,456,7890	2 and 5	[STX][ETX][STX]7890[ETX]
	1,23,456,7890	5	Error
	1,23,456,7890	4 and 5	Error
	1234567890	1 and 2	Error
"Code type": QR Code "Data transfer regardless of error result": Permit	1,23,456,7890	5	[STX]1,23,456,7890[ETX]
	1,23,456,7890	4 and 5	[STX]1,23,456,7890[ETX]
	1234567890	1 and 2	[STX]1234567890[ETX]
"Code type": PDF417 "Data transfer regardless of error result": Prohibit	1,23,456,7890	Invalid if specified.	Error
"Code type": PDF417 "Data transfer regardless of error result": Permit	1,23,456,7890	Invalid if specified.	[STX]1,23,456,7890[ETX]

6.2.1.3 Extracting AI (Application Identifier)-prefixed strings

If the scanner reads any of GS1-128 (EAN-128), GS1 DataBar (RSS), and EAN.UCC Composite symbols (excluding linear components in a UPC/EAN Composite symbol), it edits the data according to AIs and outputs it in the data transmission format selected in the scanner (see Chapter 8, Section 8.2).

The "AI-prefixed string" extraction is available in two modes--AI-delimited mode and AI parenthesizing mode. AIs to be used for data editing are listed in (3) AI table later.

(1) AI-delimited mode

In this mode, the scanner extracts strings prefixed with AIs specified (up to three types of AIs) and separates them with the specified delimiters (selectable from headers/terminators, commas and tabs) instead of AIs to output them.

■ Extraction conditions

Extraction conditions	Choices
"Data transfer regardless of error result"	Permit/Prohibit

If the scanner fails to extract an AI-prefixed string when the "Data transfer regardless of error result" is permitted, it outputs the data read as is without editing.

■ Delimiters

Delimiters can be any of the following three--header/terminator, comma and tab.

- Header/terminator

  Specifying a header/terminator as delimiters prefixes a header and suffixes a terminator to each element string separated.

  A scanner ID, code ID mark, the number of digits, prefix, and suffix can be also added to each element string if their transmissions are enabled. The number of digits is the count of each element string edited.

  Example Data read: (01)94901234567894(11)030808(13)030810
  Header: STX, Terminator: ETX, Scanner ID: Disable, Code ID mark: Disable,
  Transmission of the number of digits: Enable, Prefix/Suffix: None, BCC: Disable

AIs specified	Output data
01,11,13	[STX]0014949012345678941[ETX][STX]0006030808[ETX][STX]0006030810[ETX]

- Comma

  Specifying a comma as delimiters outputs comma-delimited data. No comma follows the tail of the data.

  A header and terminator are added to the full string. None of a scanner ID, code ID mark, the number of digits, prefix, and suffix is added even if their transmissions are enabled.

  Example Data read: (01)94901234567894(11)030808(13)030810
  Header: STX, Terminator: ETX, Scanner ID: Disable, Code ID mark: Disable,
  Transmission of the number of digits: Disable, Prefix/Suffix: None, BCC: Disable

AIs specified	Output data
01,11,13	[STX]94901234567894,030808,030810[ETX]

- Tab (ASCII 09H (HT))

  Specifying a tab as delimiters outputs tab-delimited data. No tab follows the tail of the data.

  A header and terminator are added to the full string. None of a scanner ID, code ID mark, the number of digits, prefix, and suffix is added even if their transmissions are enabled.

  Example Data read: (01)94901234567894(11)030808(13)030810
  Header: STX, Terminator: ETX, Scanner ID: Disable, Code ID mark: Disable,
  Transmission of the number of digits: Disable, Prefix/Suffix: None, BCC: Disable

AIs specified	Output data
01,11,13	[STX]94901234567894[TAB]030808[TAB]030810[ETX]

Example Data read: (01)94901234567894(11)030808(13)030810(17)040208(17)040305
Header: STX, Terminator: ETX, Scanner ID: Disable, Code ID mark: Disable,
Transmission of the number of digits: Disable, Prefix/Suffix: None, BCC: Disable

Extraction conditions	AIs specified	Delimiter	Output data
"Data transfer regardless of error result": Prohibit	01,11,17	Comma	[STX]94901234567894,030808,040208[ETX]
	17,11		[STX]040208,030808[ETX]
	17,17		[STX]040208,040305[ETX]
	12		Error
	01,12		Error
	01,01		Error
	01,11,17		[STX]94901234567894,030808,040208[ETX]
"Data transfer regardless of error result": Permit	17,11		[STX]040208,030808[ETX]
	17,17		[STX]040208,040305[ETX]
	12		[STX]019490123456789411030808130308101704020817040305[ETX]
	01,12		
	01,01		

(Note 1) Element strings will be output in the order of AIs specified.

(Note 2) If data read contains two or more element strings prefixed with the same AI, those element strings will be output in the order arranged in that data read.

(Note 3) If data read does not contain a string prefixed with the specified AI or it contains such data but its number of digits is more or less than the one defined for that AI, an error will result when the "Data transfer regardless of error result" is prohibited.

(2) AI parenthesizing mode

In this mode, the scanner parenthesizes AIs contained in data read and outputs the edited data according to the extraction conditions.

■ Extraction conditions

Extraction conditions	Choices
"Data transfer regardless of error result"	Permit/Prohibit

If the scanner fails to extract an AI-prefixed element string when the "Data transfer regardless of error result" is permitted, it outputs the data read as is without editing.

Example Header: STX, Terminator: ETX, Scanner ID: Disable, Code ID mark: Disable,
Transmission of the number of digits: Disable, Prefix/Suffix: None, BCC: Disable

Extraction conditions	Data read	Output data
"Data transfer regardless of error result": Prohibit	01949012345678941103080813030 81017040208	[STX](01)94901234567894(11)030808(13)03 0810(17)040208[ETX]
	01949012345678941103080813030 81061704020817040305	Error (Note 1)
"Data transfer regardless of error result": Permit	01949012345678941103080813030 81017040208	[STX](01)94901234567894(11)030808(13)03 0810(17)040208[ETX]
	01949012345678941103080813030 81061704020817040305	[STX]0194901234567894110308081303 0810617040208170403 05[ETX]

(Note 1) Data from the head to element string 030810 prefixed with AI (13) can be normally extracted, but the following data (as underlined below) causes an error since it starts with 6 that cannot start any AI.

(01)94901234567894(11)030808(13)030810<u>617040208170403 05</u>

(3) AI table

In the AI-prefixed string extraction, the scanner edits data according to the Application Identifiers (AIs) defined below.

AI	Format	Description
00	n2+n18	Serial Shipping Container Code (SSCC)
01	n2+n14	Global Trade Item Number (GTIN)
02	n2+n14	GTIN of Trade Items Contained in a logistic unit (For Use with AI 37 Only)
03	n2+n14	Reserved.
04	n2+n16	Reserved.
10	n2+an..20	Batch or Lot Number
11	n2+n6	Production Date (YYMMDD) (*)
12	n2+n6	Due Date (YYMMDD) (*)
13	n2+n6	Packaging Date (YYMMDD) (*)
15	n2+n6	Best Before Date (YYMMDD) (*)
17	n2+n6	Expiration Date (YYMMDD) (*)
20	n2+n2	Product Variant
21	n2+an..20	Serial Number
22	n2+an..29	HIBCC (Health Industry Business Communication Council)--Quantity, Date, Batch, and Link
23n	n3+n..19	Batch or Lot Number (Transitional Use) (**)
240	n3+an..30	Additional Product Identification Assigned by the Manufacturer
241	n3+an..30	Customer Part Number
250	n3+an..30	Secondary Serial Number
251	n3+an...30	Reference to Source Entity
252	n3+n27	Global Serial Number
30	n2+n..8	Quantity
310n	n4+n6	Net Weight, Kilograms
311n	n4+n6	Length or 1st Dimension, Meters
312n	n4+n6	Width, Diameter, or 2nd Dimension, Meters
313n	n4+n6	Depth, Thickness, Height, or 3rd Dimension, Meters
314n	n4+n6	Area, Square Meters (***)
315n	n4+n6	Volume, Liters (***)
316n	n4+n6	Volume, Cubic Meters (***)

AI	Format	Description
320n	n4+n6	Net Weight, Pounds (***)
321n	n4+n6	Length or 1st Dimension, Inches (***)
322n	n4+n6	Length or 1st Dimension, Feet (***)
323n	n4+n6	Length or 1st Dimension, Yards (***)
324n	n4+n6	Width, Diameter, or 2nd Dimension, Inches (***)
325n	n4+n6	Width, Diameter, or 2nd Dimension, Feet (***)
326n	n4+n6	Width, Diameter, or 2nd Dimension, Yards (***)
327n	n4+n6	Depth, Thickness, Height, or 3rd Dimension, Inches (***)
328n	n4+n6	Depth, Thickness, Height, or 3rd Dimension, Feet (***)
329n	n4+n6	Depth, Thickness, Height, or 3rd Dimension, Yards (***)
330n	n4+n6	Gross Weight, Kilograms (***)
331n	n4+n6	Length or 1st Dimension, Meters, Logistics (***)
332n	n4+n6	Width, Diameter, or 2nd Dimension, Meters, Logistics (***)
333n	n4+n6	Depth, Thickness, Height, or 3rd Dimension, Meters, Logistics (***)
334n	n4+n6	Area, Square Meters, Symbology (***)
335n	n4+n6	Gross Volume, Liters (***)
336n	n4+n6	Gross Volume, Cubic Meters (***)
337n	n4+n6	Kilograms per Square Meter (pressure) (***)
340n	n4+n6	Gross Weight, Pounds (***)
341n	n4+n6	Length or 1st Dimension, Inches, Logistics (***)
342n	n4+n6	Length or 1st Dimension, Feet, Logistics (***)
343n	n4+n6	Length or 1st Dimension, Yards, Logistics (***)
344n	n4+n6	Width, Diameter, or 2nd Dimension, Inches, Logistics (***)
345n	n4+n6	Width, Diameter, or 2nd Dimension, Feet, Logistics (***)
346n	n4+n6	Width, Diameter, or 2nd Dimension, Yards, Logistics (***)
347n	n4+n6	Depth, Thickness, Height, or 3rd Dimension, Inches, Logistics (***)
348n	n4+n6	Depth, Thickness, Height, or 3rd Dimension, Feet, Logistics (***)
349n	n4+n6	Depth, Thickness, Height, or 3rd Dimension, Yards, Logistics (***)
350n	n4+n6	Area, Square Inches (***)
351n	n4+n6	Area, Square Feet (***)
352n	n4+n6	Area, Square Yards (***)

AI	Format	Description
353n	n4+n6	Area, Square Inches, Logistics (***)
354n	n4+n6	Area, Square Feet, Logistics (***)
355n	n4+n6	Area, Square Yards, Logistics (***)
356n	n4+n6	Net Weight, Troy Ounces (***)
357n	n4+n6	Net Volume, Ounces (***)
360n	n4+n6	Volume, Quarts (***)
361n	n4+n6	Volume, Gallons (***)
362n	n4+n6	Gross Volume, Quarts (***)
363n	n4+n6	Gross Volume, Gallons (***)
364n	n4+n6	Volume, Cubic Inches (***)
365n	n4+n6	Volume, Cubic Feet (***)
366n	n4+n6	Volume, Cubic Yards (***)
367n	n4+n6	Gross Volume, Cubic Inches (***)
368n	n4+n6	Gross Volume, Cubic Feet (***)
369n	n4+n6	Gross Volume, Cubic Yards (***)
37	n2+n..8	Quantity (For Use with AI 02 Only)
390n	n4+n15	Amount Payable--Single Monetary Area
391n	n4+n3+n15	Amount Payable and ISO Currency Code
392n	n4+n15	Amount Payable for a Variable Measure Trade Item--Single Monetary Area
393n	n4+n3+n15	Amount Payable for a Variable Measure Trade Item and ISO Currency Code
400	n3+an..30	Customer's Purchase Order Number
401	n3+an..30	Consignment Number
402	n3+n17	Shipment Identification Number
403	n3+an..30	Routing Code
410	n3+n13	Ship to (Deliver to) EAN.UCC Global Location Number
411	n3+n13	Bill to (Invoice to) EAN.UCC Global Location Number
412	n3+n13	Purchased from EAN.UCC Global Location Number
413	n3+n13	Ship for (Deliver for) EAN.UCC Global Location Number
414	n3+n13	Identification of a Physical Location--EAN.UCC Global Location Number
415	n3+n13	EAN.UCC Global Location Number of the Invoicing Party
420	n3+an..20	Ship to (Deliver to) Postal Code Within a Single Postal Authority

AI	Format	Description
421	n3+n3+an..9	Ship to (Deliver to) Postal Code with Three-Digit ISO Country Code Prefix
422	n3+n3	Country of Origin of a Trade Item
423	n3+n15	Country of Initial Processing
424	n3+n3	Country of Processing
425	n3+n3	Country of Disassembly
426	n3+n3	Country of Final Processing
43	n2+n4+n7+an..10+n1	Carrier Assigned Tracking Number
7001	n4+n13	NATO Stock Number (NSN)
7002	n4+an..30	UN/ECE Meat Carcasses and Cuts Classification
7003	n4+n10	Effective term (YYMMDDHHMM)
7030	n4+n3+an..27	Approval Number of Processor with Three-Digit ISO Country Code, Butchery
7031	n4+n3+an..27	Approval Number of Processor with Three-Digit ISO Country Code, 1st Processing Place
703n	n4+n3+an..27	Approval Number of Processor with Three-Digit ISO Country Code, 2nd to 9th Processing Places
8001	n4+n14	Roll Products--Width, Length, Core Diameter, Direction, and Splices
8002	n4+an..20	Cellular Mobile Telephone Identifier
8003	n4+n14+an..16	EAN.UCC Global Returnable Asset Identifier (GRAI)
8004	n4+an..30	EAN.UCC Global Individual Asset Identifier (GIAI)
8005	n4+n6	Price Per Unit of Measure
8006	n4+n14+n2+n2	Identification of the Component of a Trade Item
8007	n4+an30	International Bank Account Number (IBAN)
8008	n4+n6+n6	Date and Time of Production (YYMMDDHHMMSS)
8018	n4+n18	EAN.UCC Global Service Relation Number (GSRN)
8020	n4+an25	Payment Slip Reference Number
8100	n4+n1+n5	UPC Coupon Extended Code--Number System Character and Offer Code
8101	n4+n1+n5+n4	UPC Coupon Extended Code--Number System Character, Offer Code, and End of Offer Code
8102	n4+n1+n1	UPC Coupon Extended Code--Number System Character Preceded by Zero
90	n2+an..30	FACT Data Identifiers
91	n2+an..30	Company Internal Information--Company
92	n2+an..30	Company Internal Information--Company

AI	Format	Description
93	n2+an..30	Company Internal Information--Company
94	n2+an..30	Company Internal Information--Company
95	n2+an..30	Company Internal Information--Carrier
96	n2+an..30	Company Internal Information--Carrier
97	n2+an..30	Company Internal Information--Company
98	n2+an..30	Company Internal Information--Company
99	n2+an..30	Company Internal Information

(*) To indicate only year and month, DD must be filled with "00."

(**) n indicates the length of data.

(***) n indicates the decimal point position.

a	Alphabetic characters
a3	3 alphabetic characters, fixed length
a..3	Up to 3 alphabetic characters
n	Numeric characters
n3	3 numeric characters, fixed length
n..3	Up to 3 numeric characters
an	Alphanumeric characters
an3	3 alphanumeric characters, fixed length
an..3	Up to 3 alphanumeric characters

(Note 1) If the specified AI is variable in length and the number of digits in data read is less than the maximum number of digits defined for the AI, then the output contains data read up to a GS (1Dh).

6.2.2 Data substitution mode

If the scanner reads a code specified by the "Code type" in this mode, it searches the data read for the specified string (max. 16 ASCII characters), substitutes it with the specified substitution string (max. 16 ASCII characters), and outputs it in the data transmission format selected in the scanner (see Chapter 8, Section 8.2).

■ Substitution conditions

Substitution conditions	Choices
“Code type”	Any code
	QR Code
	iQR Code
	PDF417
	Data Matrix
	MaxiCode
	Aztec
	UPC-A/EAN-13
	UPC-E
	EAN-8
	Code 128
	GS1-128 (EAN-128)
	Codabar (NW-7)
	Code 39
	Code 93
	Interleaved 2of5 (ITF)
	Standard 2of5 (STF)
	GS1 DataBar (RSS)
	EAN.UCC Composite symbology
Search string and substitution string	Max. 16 ASCII characters (00h to FFh) each

Example Code read: PDF417, Data: 12345678,
Header: STX, Terminator: ETX, Scanner ID: Disable, Code ID mark: Disable,
Transmission of the number of digits: Disable, Prefix/Suffix: None, BCC: Disable

Substitution condition	Search string and Substitution string	Output data
"Code type": PDF417	2 → A 4 → B	[STX]1A3B5678[ETX]

6.2.3 Data blocksorting mode

The scanner splits code data read into a maximum of 5 blocks at the specified split positions, sorts those blocks in the specified order, and outputs it in the data transmission format selected in the scanner (see Chapter 8, Section 8.2).

Note: The split position must be specified by the number of digits from the head of code data read. Specifying the number of digits exceeding that in the code data results in an error.

■ Blocksorting conditions

Blocksorting conditions	Choices
"Code type"	Any code
	QR Code
	iQR Code
	PDF417
	Data Matrix
	MaxiCode
	Aztec
	UPC-A/EAN-13
	UPC-E
	EAN-8
	Code 128
	GS1-128 (EAN-128)
	Codabar (NW-7)
	Code 39
	Code 93
	Interleaved 2of5 (ITF)
	Standard 2of5 (STF)
	GS1 DataBar (RSS)
	EAN.UCC Composite symbology

Example Code read: Code 128, Data: 1234567890,
Header: STX, Terminator: ETX, Scanner ID: Disable, Code ID mark: Disable,
Transmission of the number of digits: 4 digits, Prefix/Suffix: None, BCC: Disable

Split position	Order of blocks	Output data
3rd position, 8th position	Block 2, 1, 3	[STX]K00104567812390[ETX]
3rd position, 8th position	Block 1, 3	[STX]K000512390[ETX]

6.2.4 ADF script mode

The ADF script refers to a simple program language designed for editing of data read. It enables the following functions.

(1) Extracting data that is fixed or variable in length

(2) Supporting Application Identifiers (AIs) in GS1-128 (EAN-128), GS1 DataBar (RSS) and EAN.UCC Composite symbols

(3) Sorting data blocks into the specified order

(4) Collating data for verification

(5) Outputting same data repeatedly

(6) Performing four arithmetic operations including residue calculation, e.g., transformation of units

(7) Substituting data

(8) Comparing character strings

(9) Driving indicator LED and beeper

The ADF script mode can be programmed with the configuration software (ScannerSetting_2D). To configure the scanner with the ADF script, transfer the script to the scanner or generate an ADF script QR code symbol with the configuration software (ScannerSetting_2D) and use the scanner to read the symbol.

For the specifications and instructions for use of the ADF script, refer to the ADF Script User's Guide.

Note: The GTIN format conversion and ADF script mode cannot be used together with any of other edit modes (data extraction mode, data substitution mode, and data blocksorting mode).

6.3 Point Scan Mode

In the point scan mode, you can aim at a target code by matching up the center spot of the marker beam with that code.

If there is no code at that center spot or the scanner cannot detect the marker beam due to high levels of ambient lighting, the scanner cannot read anything. The point scan mode takes effect only when the marker is permitted to light.

6.4 Scanning a Mirror Image 2D Code

If you enable the mirror image scanning with the configuration software (ScannerSetting_2D), the scanner can scan a mirror image 2D code as well as a normal image. Note that when the mirror image scanning is enabled, the time required for scanning may increase.

6.5 Scanning a Black-and-white Inverted Code

The scanner usually scans a black-and-white normal code (black cells/bars on a white background). You can switch the scanner to scan a black-and-white inverted code (white cells/bars on a black background) or to scan both types of codes while automatically identifying them, using the QR-coded parameter menu or the configuration software (ScannerSetting_2D).

Note that the automatic detection scanning may take more time than normal code or inverted code scanning.

A black-and-white inverted code requires a black quiet zone of more than the number of cells defined in the code specifications.

6.6 Scanning Structured Appended QR (iQR) Code Symbols

QR Code symbology can split data into a maximum of 16 blocks and encode each of them into a Structured Appended QR Code symbol (model 1 or 2) or Structured Appended iQR Code symbol. Structured Appended Code scanning is possible only with the same Code model.

The scanner can scan Structured Appended Code symbols and restore them to the original data string in edit mode, batch edit mode, and non-edit mode, which you can select using the QR-coded parameter menu or configuration software (ScannerSetting_2D).

Edit mode

The scanner accumulates and edits Structured Appended Code symbols read and then sends the edited data to the host computer. If the total data volume of Structured Appended Code symbols exceeds 8 kilobytes, a read error will result and the accumulated data will be discarded.

Batch edit mode (for QR Code Model 1 and Model 2 only)

If all the Structured Appended Code symbol which is split in less than four to be scanned lie within the readable area, the scanner reads them all once and then edits and sends them to the host computer.

Non-edit mode

Each time a single split Code symbol is read, the scanner sends the data read to the host computer.

When scanning Structured Appended Code symbols, the scanner beeps in a different way from usual. That is, when the scanner reads the first split code, it beeps twice and enters the Structured Appended Code scanning mode. When the scanner completes the sequence of scanning, it beeps three times.

Note: If you scan any non-split QR(iQR) Code symbol or a code other than a QR(iQR) Code symbol midway through a sequence of Structured Appended Code scanning, the scanner cancels the Structured Appended Code scanning, discards the Structured Appended Code data already scanned, and sends the code scanned last.

Note: If the scanner switches to standby in the Auto-off mode (after approx. 5 seconds of holding down the trigger switch or by releasing the trigger switch within 5 seconds) or the Structured Appended Code scanning interval exceeds approx. 3 seconds in any trigger switch operating mode except Auto-off mode, then the scanner discards the data scanned and cancels the Structured Appended Code scanning sequence.

Note: If you scan a Structured Appended Code symbol of any other Code before completion of the current scanning sequence, the scanner discards the data already scanned and starts a new scanning sequence.

6.7 Multi-line Barcode Scanning

The scanner can scan up to 3 lines of bar codes in the readable area at any one time. You can specify the number of lines to be scanned, the data output order and output format using the configuration software (ScannerSetting_2D).*

6.7.1 Number of lines

The number of lines allowed for multi-line barcode scanning is 2 or 3. This setting is essential.

6.7.2 Data output order

You can specify the data output order by designating code types*[1], heading characters*[2], or the number of digits to be scanned*[3].

*[1] Code types should be selected from readable bar codes you enable. This setting is essential.

*[2] Up to two heading characters can be specified. If a question mark (?) is specified, it acts as a wild card. This setting can be omitted.

*[3] The number of digits to be scanned varies depending upon the code type. This setting is essential.

Note: The number of characters for Code 39 symbols should be specified including start and stop codes.

6.7.3 Output format

You can select either the header/terminator- or comma-delimited output format.

(1) Header/terminator-delimited output format

Specifying this format allows the scanner to output multiple lines of barcode data in succession in the data transmission format selected (see Section 8.2) so that the headers and terminators act as delimiters. For UPC and EAN codes, the number of digits will be omitted.

(2) Comma-delimited output format

Specifying this format allows the scanner to output multiple lines of barcode data delimited with commas in the data transmission format selected (see Section 8.2). Note that the scanner outputs the code ID mark specified for the first line barcode and the number of digits including the delimiter commas. The number of digits will not be omitted even for UPC and EAN codes.

Note 1: Bar code types specified for multi-line barcode scanning cannot be read individually.

Note 2: The scanner cannot read multi-line barcodes of UPC/EAN with add-on.

Note 3: If linear components in a UPC/EAN Composite symbol are specified for multi-line barcode scanning, EAN.UCC Composite symbols including the specified linear components cannot be read.

6.8 Scanning an SQRC (Security QR Code) Symbol

An SQRC symbol refers to a security QR Code symbol that consists of public and nonpublic data. The nonpublic data can be read only when the encryption key configured in the scanner matches the one in the SQRC symbol.

To read an SQRC symbol with the scanner, it is necessary to enable SQRC scanning ("SQRC symbols only" or "both SQRC symbols and QR Code symbols") using the configuration software (ScannerSetting_2D). The following SQRC related parameters can be also specified--"Data transmission after match of encryption key," and "Data transmission after mismatch of encryption key."

Note: SQRC scanning requires configuring an encryption key beforehand with the SQRC configuration software (SQRC Setting) separately prepared.

Chapter 7 Beeper, Indicator LED, Marker Beam, and Illumination LEDs

7.1 Beeper

(1) Beeping

The scanner emits a short or long beeps, once or a couple of times as described below.

The beeper emits **a short beep** when:

- the scanner has read a code successfully,
- code data read matches the master data in the data verification mode,(2-point:2 beeps, n-point:1 beep)
- the scanner has read a Structured Appended QR (iQR) Code symbol,
- the "Start setting" or "End setting" code is read (3 beeps) or the parameter setting QR Code symbols are read (1 beep) from the QR-coded parameter menu (given in Chapter 12),
- the configuration software (ScannerSetting_2D) starts up or accepts new settings (3 beeps), or
- the scanner has read a batch-process QR Code symbol generated with the configuration software (ScannerSetting_2D) (3 beeps).
- a Bluetooth® wireless link is established, or
- the charge of the battery cartridge has lowered, turning the scanner off (5 beeps, slightly longer).

The beeper emits **a long beep** when:

- code data read does not match the master data in the data verification mode,
- the scanner has read Structured Appended QR (iQR) Code symbols in edit mode and the accumulated data exceeds 8 kilobytes,
- a master code has the wrong number of digits during registration of master data,
- a code other than a parameter setting code is read during parameter setting by the QR-coded parameter menu,
- a transmission error or timeout occurred when the scanner was communicating with the configuration software (ScannerSetting_2D),
- the encryption key of data read does not match the one configured in the scanner in SQRC scanning (when the "data transmission after mismatch of encryption key" is disabled),
- a communications error has occurred, or
- an invalid control command is received.
- a Bluetooth® wireless link is broken,
- transfer of communications adapter parameter settings is ended normally (1 beep) or abnormally (3 beeps), or
- the scanner has failed to save the parameter settings entered with the QR-coded parameter menu or the configuration software.

When the scanner is turned on, the configuration software (ScannerSetting_2D) provides a choice of beeper ON/OFF (default: ON), but does not provide a choice of beeper tone.

You can disable the beeper using the QR-coded parameter menu or configuration software (ScannerSetting_2D)*. In any of the following cases, however, the beeper sounds regardless of that beeper setting:

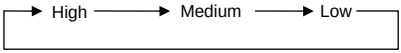
- when you make settings by scanning the QR-coded parameter menu,
- when the scanner receives a beeper-ON command from the host computer,
- when the configuration software (ScannerSetting_2D) starts up or any setting you have made is established,
- when the scanner reads a batch-process QR Code symbol, and
- when the parameter values are saved by a PW command (refer to Appendix 2).
- when the Bluetooth wireless link is established or broken,
- when the charge of the battery cartridge has lowered,
-when the scanner has failed to save the parameter settings, or
-when transfer of communications adapter parameter settings is normally ended.

(2) Adjusting the beeper volume

You can adjust the beeper volume to three levels--high, medium and low--using the QR-coded parameter menu or configuration software (ScannerSetting_2D). The factory default is High.

Note: Enabling the Bluetooth interface with the "Start operation" QR Code symbol allows the beeper volume adjustment.

Each time the "Beeper volume" QR Code symbol is read, the beeper volume cycles as shown below. The factory default is High.



Even if the scanner is turned off, this setting will be retained.

7.2 Indicator LED

The indicator LED lights or flashes in blue, green, red or orange as described below.

The indicator LED lights **in blue** when:

- the scanner has read a code successfully,
- the scanner has read a Structured Appended QR (iQR) Code symbol,
- code data read matches the master data in the data verification mode, or
- master data has been successfully registered in the data verification mode.

The indicator LED lights **in green** when:

- the scanner is ready to register master data.

The indicator LED lights **in red** when:

- the trigger switch is pressed when the trigger switch control is disabled.

The indicator LED **flashes in red** when:

- the scanner has received an abnormal control command,
- the scanner has failed to edit data read,
- no master data has been registered in the data verification mode(n-point).
- code data read does not match the master data in the data verification mode,
- a master code has the wrong number of digits during registration of master data,
- the scanner has read Structured Appended QR (iQR) Code symbol in edit mode and the accumulated data exceeds 8 kilobytes,
- the scanner has failed to save parameter values specified with the configuration software (ScannerSetting_2D), QR-coded parameter menu, or control commands,
- a code other than a parameter setting code is read during parameter setting by the QR-coded parameter menu,
- a transmission error or timeout occurred when the scanner was communicating with the configuration software (ScannerSetting_2D),
- a run-time error has occurred in ADF script,
- the trigger switch is pressed when a Bluetooth wireless link is broken.
- the trigger switch is pressed on "End operation."

The indicator LED **flashes in orange** when:

- the charge of the battery cartridge has lowered or
- the scanner turns itself off due to low charge of the battery cartridge.

The indicator LED **flashes in blue** when:

- the "Start setting" or "End setting" code is read from the QR-coded parameter menu (given in Chapter 12),
- the scanner starts or ends a sequence of Structured Appended QR (iQR) Code scanning,
- the parameter values are saved by a PW command (refer to Appendix 2),
- scanner as master is establishing the Bluetooth wireless link.
- scanner as slave is establishing the Bluetooth wireless link

The indicator LED can be disabled with the QR-coded parameter menu or configuration software (ScannerSetting_2D). In any of the following cases, however, the indicator LED comes on regardless of the current LED setting.

- When the scanner is being customized with the QR-coded parameter menu (Chapter 12),
- When the scanner receives an LED-ON command (LB, LG or LR) from the host computer (refer to Appendix 2),
- When the configuration software (ScannerSetting_2D) starts up or any setting is newly established,
- When the scanner reads a batch-process QR Code symbol,
- When the parameter values are saved by a PW command (refer to Appendix 2),
- When the scanner is in the scanner entry mode (refer to control command "E" in Appendix 2),
- When a master code is being registered or the registration is completed,
- When any error has occurred during registration of a master code,
- When the scanner has failed to save parameter values specified with the configuration software (ScannerSetting_2D), QR-coded parameter menu, or control commands,
- When a run-time error has occurred in ADF script, or
- When the trigger switch is pressed when the trigger switch control is disabled.
- the Bluetooth® wireless link status is displayed,
- the charge of the battery cartridge has lowered,
- the charging/discharging state is displayed,
- the parameter transfer status from the scanner to the communications adapter is displayed, or
- the scanner failed to save setting.

7.3 Marker Beam

The red marker beam (semiconductor laser) comes on to indicate the scanning area as a guide.

The marker provides a choice of the three modes--normal marker mode, marker-OFF mode and marker-ON mode that can be selected by using the QR-coded parameter menu or the configuration software (ScannerSetting_2D).

(1) Normal marker mode

When the trigger switch is in Auto-off mode or auto-off of the Auto stand mode:

When the scanner is ready to scan (that is, within approx. 5 seconds from the depression of the trigger switch or until completion of reading from that), the marker beam remains on. If you release the trigger switch when the scanner is ready, the marker beam will go off.

When the trigger switch is in Momentary switching mode or Alternate switching mode:

In the momentary switching mode, holding down the trigger switch turns on the marker beam.

When the scanner is ready to scan (that is, while the trigger switch is held down in the momentary switching mode or when the scanner is ready to scan in the alternate switching mode), the marker beam remains on. When the scanner is on standby (that is, the trigger switch is released in the momentary switching mode or when the scanner is on standby in the alternate switching mode), the marker beam will go off.

When the trigger switch is in Momentary switching mode (Reverse Type):

In the momentary switching mode (Reverse Type), the marker beam remains on while the trigger switch is in the released position.
When the scanner is ready to scan (that is, the trigger switch is released in the momentary switching mode reverse type), the marker beam remains on. When the scanner is on standby (that is, while the trigger switch is held down in the momentary switching mode reverse type), the marker beam will go off.

When the trigger switch is in Continuous reading mode 1 or 2:

Turning the scanner on activates the marker and keeps it on.

If the scanner receives the Z, READOFF or LOFF command, it turns off the marker beam; if it receives the R, READON or LON command, it keeps the marker beam on.

When the trigger switch is in Auto sensing mode or auto sense state of the Auto stand mode:

When the scanner senses a code coming into the readable area and becomes ready to scan, it automatically turns on the marker beam. After approx. 3 seconds from completion of scanning or if scanning is not completed within approx. 3 seconds, the scanner switches to standby and turns off the marker beam.

(2) Marker-OFF mode

The marker beam will not come on under any conditions.

(3) Marker-ON mode

When the scanner switches to standby, the marker beam is turned on for approx. 30 seconds.

When it is ready to scan, the marker beam remains on.

7.4 Illumination LEDs

When the scanner is ready to scan, the illumination LEDs are turned on.

The illumination LEDs provide the two choices--ON, OFF by using the configuration software (ScannerSetting_2D).

Enable or disable of “Power save mode” can be selected. The default setting is “Enable”.
When “Power save mode” is enabled, 20% power consumption is saved by less brightness of the illumination LEDs.

(Note) When “Power save mode” is enabled, a reading distance may be shorter under 500 lx ambient illumination.

Chapter 8 Communication

8.1 Bluetooth® Interface

The QR-coded parameter menu and the configuration software (ScannerSetting_2D) provide a choice of various communications conditions. Under the communications conditions you choose, code data read can be transferred to the external equipment or computer.

(1) Communications protocol

When the scanner is in SPP profile, you can select either non-acknowledge mode, ACK/NAK mode, or data packaging mode.

Non-acknowledge mode (default)

The scanner transfers code data read, regardless of the CTS signal level.

ACK/NAK mode

The scanner transfers code data read, regardless of the CTS signal level. After that, however, it waits for the response from the host and processes it. The configuration software (ScannerSetting_2D) only provides ACK/NAK timeout settings from 100 ms to 9.9 s in 100 ms increments.

ACK: Normal end
NAK: Retransfer

Data packaging mode

- To host

The scanner wraps the code data in a packet with a CRC for transfer to a commercially available Bluetooth® device or other equipment. For further details, see Section 8.4.

(2)Timeout period for slave to wait for a connection request

The scanner, as a slave, waits for a connection request from the master for the specified timeout period--2 (default), 4, 10, or 30 minutes.

If the scanner cannot receive a connection request from the master within the specified timeout period, it switches to standby, the same status as the Bluetooth® wireless link has been broken.

8.2 HID Profile

The scanner supports the Human Interface Device Profile (HID) that enables connecting to an iPhone or iPad equipped with Bluetooth module that is compatible with Bluetooth® Specification Ver. 2.1+EDR.

(1) CAPS Lock state

Select the CAPS Lock ON or OFF to match the state of the host computer. (Default: CAPS Lock OFF)

(2) Keyboard type

Select the type of the connected keyboard. (Default: Type 106, Japanese)

(3) Numeric data transmission format

Select the “inboard numeric keys” or “numeric keyboard” on the connected keyboard. (Default: Inboard numeric keys)

(4) Binary data conversion

Select the conversion type to be applied to data read, from the following:

- ”No conversion”(ASCII) (default) : Outputs 00h to 7Fh data in ASCII format bytewise. Selecting this parameter does not output 80h to FFh data. Scanning operation is completed, when data is 80h to FFh.
- "Binary conversion" : Converts 00h to FFh data to binary format bytewise.and outputs it.
- "Kanji conversion" : Converts 00h to FFh data to Shift-JIS format and outputs it, two bytes at a time. If there is any data to which this Kanji conversion cannot apply, it converts such data to binary format bytewise and outputs it instead.
  8140 to 9FFC、E040 to EFFC are allocated for Kanji
  e.g.) When scanning code data is “Kanji”,
  Data : Kanji
  Shift JIS : 8ABF 8E9A

Binary conversion format	Output data	Note
No conversion	No output	Scanning operation is completed only.
Binary conversion	8Ah BFh 8Eh 9Ah Assigned characters	Output with binary data 1 byte by 1 byte
Kanji conversion	“Kanji”	Output with Kanji conversion (Note)

Note that some applications may fail to output converted data as it is displayed.

8.3 Communication Format

■ Data transmission format

Select one of the following two data transmission formats.

Header	Scanner ID	Code ID mark	Prefix	No. of digits				Code data	Suffix	Terminator	BCC
				n1	n2	n3	n4				

Header	Scanner ID	Prefix	Code ID mark	No. of digits				Code data	Suffix	Terminator	BCC
				n1	n2	n3	n4				

(1) Header/Terminator

The following choices are available.

SPP profile
Header: None (default), STX, or User Selection
Terminator: CR (default), None, LF, CR/LF, ETX, or User Selection

HID profile
Header: None (default), TAB, ESC, ENTER, or User Selection
Terminator: ENTER (default), None, TAB, ESC, or User Selection

For details, refer to Chapter 11.

(2) Scanner ID

A scanner ID is a unique serial number assigned to an individual scanner at the time of shipment. It consists of six numerals.

(3) Prefix/Suffix

A prefix or suffix consists of up to eight ASCII characters (00h to FFh). You can set a prefix or suffix with the configuration software (ScannerSetting_2D). (Default: No prefix or suffix)

(4) BCC

The Block Character Check (BCC) exclusive-ORs all bits at the same bit level in characters following the header and preceding the terminator in a transmission block to generate a horizontal parity byte to be transferred in a binary code. The BCC can be enabled or disabled. If no header is prefixed or the USB keyboard interface is selected, no BCC will be transferred.

(5) Code ID mark

This optional field specifies the code system. It offers ten combinations with five code ID marks (Type 1, Type 2, Type 3, Type 4, and user-defined) and two output modes (coupling and separating) as listed below.
You can also select whether or not to transmit the code ID mark. (Default: No transmission)

(1/2)

Code type			Code ID mark			
			Type 1		Type 2	
			Coupling	Separating	Coupling	Separating
2D codes	QR Code		Q		Q	
	Structured Appended QR Code	Edit mode	Q		Q	
		Batch edit mode	Q		Q	
		Non-edit mode	S		S	
	MicroQR Code		Q		Q	
	SQRC		Q		Q	
	iQR Code		G		G	
	Structured Appended iQR Code	Edit mode	G		G	
		Non-edit mode	S		S	
	MaxiCode		X		X	
	PDF417		Y		Y	
	MicroPDF417		Y		Y	
	Data Matrix	Square	Z		Z	
		Rectangular	Z		Z	
	Aztec		J		J	

Code type				Code ID mark			
				Type 1		Type 2	
				Coupling	Separating	Coupling	Separating
Bar codes	UPC-A	Without add-on		A		A	
		With 2-digit add-on	Linear component	A		A	
			Add-on	None		None	
		With 5-digit add-on	Linear component	A		A	
			Add-on	None		None	
	UPC-E	Without add-on		C		E	
		With 2-digit add-on	Linear component	C		E	
			Add-on	None		None	
		With 5-digit add-on	Linear component	C		E	
			Add-on	None		None	
	EAN-13	Without add-on		A		F	
		With 2-digit add-on	Linear component	A		F	
			Add-on	None		None	
		With 5-digit add-on	Linear component	A		F	
			Add-on	None		None	
	EAN-8	Without add-on		B		FF	
		With 2-digit add-on	Linear component	B		FF	
			Add-on	None		None	
		With 5-digit add-on	Linear component	B		FF	
			Add-on	None		None	
	Interleaved 2of5			I		I	
	Standard 2of5(short)			H		H	
	Standard 2of5(normal)			H		H	
	Code 39			M		M	
	Code 39 Full ASCII			M		M	
	Codabar (NW-7)			N		N	
	Code 128			K		K	
	GS1-128 (EAN-128)			W		W	
	Code 93			L		L	
	GS1 DataBar (RSS) (Note 1)			R		R	

Code type					Code ID mark			
					Type 1		Type 2	
					Coupling	Separating	Coupling	Separating
EAN.UCC Composite symbols	RSS (Note 1) CC-A RSS (Note 1) CC-B		RSS		V	R	V	R
			CC-A, CC-B		None	Y (Note 2)	None	Y (Note 2)
	UPC-A CC-A, UPC-A CC-B	UPC-A	Without add-on		V	A	V	A
			With 2-digit add-on	Linear component	V	A	V	A
				Add-on	None	None	None	None
			With 5-digit add-on	Linear component	V	A	V	A
				Add-on	None	None	None	None
		CC-A, CC-B			None	Y (Note 2)	None	Y (Note 2)
	EAN-13 CC-A, EAN-13 CC-B	EAN-13	Without add-on		V	A	V	F
			With 2-digit add-on	Linear component	V	A	V	F
				Add-on	None	None	None	None
			With 5-digit add-on	Linear component	V	A	V	F
				Add-on	None	None	None	None
		CC-A, CC-B			None	Y (Note 2)	None	Y (Note 2)
	UPC-E CC-A, UPC-E CC-B	UPC-E	Without add-on		V	C	V	E
			With 2-digit add-on	Linear component	V	C	V	E
				Add-on	None	None	None	None
			With 5-digit add-on	Linear component	V	C	V	E
				Add-on	None	None	None	None
		CC-A, CC-B			None	Y (Note 2)	None	Y (Note 2)
	EAN-8 CC-A, EAN-8 CC-B	EAN-8	Without add-on		V	B	V	FF
			With 2-digit add-on	Linear component	V	B	V	FF
				Add-on	None	None	None	None
			With 5-digit add-on	Linear component	V	B	V	FF
				Add-on	None	None	None	None
		CC-A, CC-B			None	Y (Note 2)	None	Y (Note 2)
	EAN-128 CC-A, EAN-128 CC-B, EAN-128 CC-C	GS1-128 (EAN-128)			V	W	V	W
		CC-A, CC-B, CC-C			None	Y (Note 2)	None	Y (Note 2)

Code type			Code ID mark			
			Type 3		Type 4 (Note 3)	
			Coupling	Separating	Coupling	Separating
2D codes	QR Code		P01		]Qm	
	Structured Appended QR Code	Edit mode	P01		]Qm	
		Batch edit mode	P01		]Qm	
		Non-edit mode	P01		S (Note 4)	
	MicroQR Code		P01		Q (Note 4)	
	SQRC		P01		Q (Note 4)	
	iQR Code		G		]Qm	
	Structured Appended iQR Code	Edit mode	G		]Qm	
		Non-edit mode	S		S	
	MaxiCode		P02		]Um	
	PDF417		X		]L0	
	MicroPDF417		X		]L0	
	Data Matrix	Square	P00		]dm	
		Rectangular	P00		]dm	
	Aztec		z		]zm	

Code type				Code ID mark			
				Type 3		Type 4 (Note 3)	
				Coupling	Separating	Coupling	Separating
Bar codes	UPC-A	Without add-on		A		]X0	
		With 2-digit add-on	Linear component	A		]X3	]X0
			Add-on	None		None	]X1 (Note 2)
		With 5-digit add-on	Linear component	A		]X3	]X0
			Add-on	None		None	]X2 (Note 2)
	UPC-E	Without add-on		A		]X0	
		With 2-digit add-on	Linear component	A		]X3	]X0
			Add-on	None		None	]X1 (Note 2)
		With 5-digit add-on	Linear component	A		]X3	]X0
			Add-on	None		None	]X2 (Note 2)
	EAN-13	Without add-on		A		]E0	
		With 2-digit add-on	Linear component	A		]E3	]E0
			Add-on	None		None	]E1 (Note 2)
		With 5-digit add-on	Linear component	A		]E3	]E0
			Add-on	None		None	]E2 (Note 2)
	EAN-8	Without add-on		A		]E4	
		With 2-digit add-on	Linear component	A		]E5	]E4
			Add-on	None		None	]E1 (Note 2)
		With 5-digit add-on	Linear component	A		]E6	]E4
			Add-on	None		None	]E2 (Note 2)
	Interleaved 2of5			F		]Im	
	Standard 2of5(short)			G		]R0	
	Standard 2of5(normal)			G		]S0	
	Code 39			B		]Am	
	Code 39 Full ASCII			B		]Am	
	Codabar (NW-7)			C		]Fm	
	Code 128			D		]Cm	
	GS1-128 (EAN-128)			K		]C1	
	Code 93			E		]G0	
	GS1 DataBar (RSS) (Note 1)			R		]e0	

Code type					Code ID mark			
					Type 3		Type 4 (Note 3)	
					Coupling	Separating	Coupling	Separating
EAN.UCC Composite symbols	RSS (Note 1) CC-A RSS (Note 1) CC-B		RSS		T	R	]e0	
			CC-A, CC-B		None	X (Note 2)	None	
	UPC-A CC-A, UPC-A CC-B	UPC-A	Without add-on		T	A	]X0	
			With 2-digit add-on	Linear component	T	A	]X3	]X0
				Add-on	None	None	None	]X1 (Note 2)
			With 5-digit add-on	Linear component	T	A	]X3	]X0
				Add-on	None	None	None	]X2 (Note 2)
		CC-A, CC-B			None	X (Note 2)	]e0 (Note 2)	
	EAN-13 CC-A, EAN-13 CC-B	EAN-13	Without add-on		T	A	]E0	
			With 2-digit add-on	Linear component	T	A	]E3	]E0
				Add-on	None	None	None	]E1 (Note 2)
			With 5-digit add-on	Linear component	T	A	]E3	]E0
				Add-on	None	None	None	]E2 (Note 2)
		CC-A, CC-B			None	X (Note 2)	]e0 (Note 2)	
	UPC-E CC-A, UPC-E CC-B	UPC-E	Without add-on		T	A	]X0	
			With 2-digit add-on	Linear component	T	A	]X3	]X0
				Add-on	None	None	None	]X1 (Note 2)
			With 5-digit add-on	Linear component	T	A	]X3	]X0
				Add-on	None	None	None	]X2 (Note 2)
		CC-A, CC-B			None	X (Note 2)	]e0 (Note 2)	
	EAN-8 CC-A, EAN-8 CC-B	EAN-8	Without add-on		T	A	]E4	
			With 2-digit add-on	Linear component	T	A	]E5	]E4
				Add-on	None	None	None	]E1 (Note 2)
			With 5-digit add-on	Linear component	T	A	]E6	]E4
				Add-on	None	None	None	]E2 (Note 2)
		CC-A, CC-B			None	X (Note 2)	]e0 (Note 2)	
	EAN-128 CC-A, EAN-128 CC-B, EAN-128 CC-C	GS1-128 (EAN-128)			T	K	]e0	
		CC-A, CC-B, CC-C			None	X (Note 2)	None	

(Note 1) GS1 DataBar (RSS) represents: GS1 DataBar Omnidirectional (RSS-14), GS1 DataBar Truncated (RSS-14 Truncated), GS1 DataBar Limited (RSS-14 Limited), GS1 DataBar Stacked (RSS-14 Stacked), GS1 DataBar Expanded (RSS Expanded), GS1 DataBar Stacked Omnidirectional (RSS-14 Stacked Omnidirectional), and GS1 DataBar Expanded Stacked (RSS Expanded Stacked).

(Note 2) These code ID marks are contained in code data.

(Note 3) Type 4 is a code ID mark system compliant with the AIM USA "Guidelines on Symbology Identifiers." The "m" suffix is a modifier character that differs depending upon options of individual symbologies as defined below.

Code Type		"m" (Modifier character)	Options
2D codes	QR Code	0	Model 1
		1	Model 2
	iQR Code	A	No FNC1 in the 1st character positions from start code
		C	FNC1 in the 1st character positions from start code
		E	FNC1 in the 2nd character positions from start code
	MaxiCode	0	mode 4, mode 5
		1	mode 2, mode 3
	Data Matrix	1	ECC-200
		2	ECC-200 (FNC1 in the 1st or 5th character position from start code)
		3	ECC-200 (FNC1 in the 2nd or 6th character position from start code)
	Aztec	0	No options
		1	FNC1 preceding the 1st message character
		2	FNC1 subsequent to the 1st character or digit pair
Bar codes	Interleaved 2of5	0	Scanning enabled, without a check digit
		1	Scanning enabled, with a check digit (Check digit transmission enabled)
		3	Scanning enabled, with a check digit (Check digit transmission disabled)
	Code 39 Code 39 Full ASCII	0	Scanning enabled, without a check digit
		1	Scanning enabled, with a check digit (Check digit transmission enabled)
		3	Scanning enabled, with a check digit (Check digit transmission disabled)
	Codabar	0	Scanning enabled, without a check digit
		1	Scanning enabled, with a check digit (Check digit transmission enabled)
		3	Scanning enabled, with a check digit (Check digit transmission disabled)
	Code 128	0	No FNC1 in the 1st and 2nd character positions from start code
		2	FNC1 in the 2nd character position from start code

Example: The code ID mark for Interleaved 2of5 with option "Scanning enabled, with a check digit (Check digit transmission disabled)" is]I3.

]: Flag character (ASCII 93h)
I: Code character (Interleaved 2of5)
3: Modifier character (See the table above.)

(Note 4) For code ID marks not compliant with the AIM USA "Guidelines on Symbology Identifiers," same characters as ones defined in Type 1 apply.

(6) Number of digits

This optional field specifies whether or not to transmit the number of digits (2 or 4 bytes) of code data to transmit or disables the transmission (default). Note that UPC and EAN codes (except GS1-128 (EAN-128)) skip this field.

4 digits (4 byte) transmission

n1: thousands (0 to 9)
n2: hundreds (0 to 9)
n3: tens (0 to 9)
n4: units (0 to 9)

2 digits (2 byte) transmission

n1: tens (0 to 9)
n2: units (0 to 9)

(7) Code data

The data format for each symbology is described below.

QR Code / MicroQR Code / iQR Code

Code data read will be transmitted as is.

Structured Appended QR Code / Structured Appended iQR Code

In edit mode and batch edit mode (Structured Appended QR Code only): The scanner edits code data read and then transmits it. It does not transmit the code number, number of splits, or parity.

In non-edit mode: The scanner transmits the code number, the number of splits, parity, and code data read. The code number and the number of splits are 1 byte each and the parity, 2 bytes in hexadecimal format.

SQRC

Code data read will be transmitted as is. When “Enable transmission of disclosed data only” is selected in “SQRC Encryption key match”, it transmits only non-disclosure data.

X1 X2 ･･･Xn-1 Xn Y1 Y2 ･･･Ym-1 Ym

Xn：Disclosure data

Ym：Non-disclosure data

When “Disclosure data plus non-disclosure data” is selected, the following format applies.

X1 X2 ･･･Xn-1 Xn Y1 Y2 ･･･Ym-1 Ym

When “Transmit only non-disclosure data” is selected, the following format applies.

Y1 Y2 ･･･Ym-1 Ym

PDF417, MicroPDF417, MaxiCode , Data Matrix , and Aztec

Code data read will be transmitted as is.

UPC-A

You can select whether or not to transmit the padding character "0," number system character "S," and a check digit to the host. Disabling the transmission of the number system character "S" automatically disables the transmission of the padding character "0."

The conversion to the GTIN format is selectable. For the GTIN format conversion, refer to Section 8.3.

When the conversion to the GTIN format is disabled, the following format applies.

0 S X_1 X_2 X_3 X_4 X_5 X_6 X_7 X_8 X_9 X_{10} C/D

0: Padding character for adjustment of the data length
S: Number system character

UPC-A with add-on

A code ID mark precedes add-on code data under the conditions "Code ID mark: Type 4" and "Code ID mark output mode: Separating." (For details about the code ID mark, refer to (5) Code ID mark on pages 42 to 46.)

The conversion to the GTIN format is selectable. For the GTIN format conversion, refer to Section 8.3.

When the conversion to the GTIN format is disabled, the following formats apply.

With 2-digit add-on:
0 S X_1 X_2 X_3 X_4 X_5 X_6 X_7 X_8 X_9 X_{10} C/D X_{11} X_{12}

With 5-digit add-on:
0 S X_1 X_2 X_3 X_4 X_5 X_6 X_7 X_8 X_9 X_{10} C/D X_{11} X_{12} X_{13} X_{14} X_{15}

0: Padding character for adjustment of the data length
S: Number system character
$X_{11\text{-}15}$: Add-on code data

UPC-E

You can select whether or not to transmit the padding character "0," number system character "S," and a check digit to the host. Disabling the transmission of the number system character "S" automatically disables the transmission of the padding character "0."

The conversion to the GTIN format or to the UPC-A are selectable. For the GTIN format conversion, refer to Section 8.3.

When the conversion to the GTIN format is disabled, the following formats apply.

- Conversion to UPC-A disabled

X_1 X_2 X_3 X_4 X_5 X_6 C/D

- Conversion to UPC-A enabled

X_6=0-2	0 S X_1 X_2 X_6 0 0 0 0 X_3 X_4 X_5 C/D
X_6=3	0 S X_1 X_2 X_3 0 0 0 0 0 X_4 X_5 C/D
X_6=4	0 S X_1 X_2 X_3 X_4 0 0 0 0 0 X_5 C/D
X_6=5-9	0 S X_1 X_2 X_3 X_4 X_5 0 0 0 0 X_6 C/D

0: Padding character for adjustment of the data length
S: Number system character

UPC-E with add-on

A code ID mark precedes add-on code data under the conditions "Code ID mark: Type 4" and "Code ID mark output mode: Separating." (For details about the code ID mark, refer to (5) Code ID mark on pages 42 to 46.)

The conversion to the GTIN format or to the UPC-A are selectable. For the GTIN format conversion, refer to Section 8.3.

When the conversion to the GTIN format is disabled, the following formats apply.

With 2-digit add-on:
- Conversion to UPC-A disabled

0 X_1 X_2 X_3 X_4 X_5 X_6 C/D X_7 X_8

- Conversion to UPC-A enabled

X_6=0-2	0 S X_1 X_2 X_6 0 0 0 0 X_3 X_4 X_5 C/D X_7 X_8
X_6=3	0 S X_1 X_2 X_3 0 0 0 0 0 X_4 X_5 C/D X_7 X_8
X_6=4	0 S X_1 X_2 X_3 X_4 0 0 0 0 0 X_5 C/D X_7 X_8
X_6=5-9	0 S X_1 X_2 X_3 X_4 X_5 0 0 0 0 X_6 C/D X_7 X_8

With 5-digit add-on:
- Conversion to UPC-A disabled

0 X_1 X_2 X_3 X_4 X_5 X_6 C/D X_7 X_8 X_9 X_{10} X_{11}

- Conversion to UPC-A enabled

X_6=0-2	0 S X_1 X_2 X_6 0 0 0 0 X_3 X_4 X_5 C/D X_7 X_8 X_9 X_{10} X_{11}
X_6=3	0 S X_1 X_2 X_3 0 0 0 0 0 X_4 X_5 C/D X_7 X_8 X_9 X_{10} X_{11}
X_6=4	0 S X_1 X_2 X_3 X_4 0 0 0 0 0 X_5 C/D X_7 X_8 X_9 X_{10} X_{11}
X_6=5-9	0 S X_1 X_2 X_3 X_4 X_5 0 0 0 0 X_6 C/D X_7 X_8 X_9 X_{10} X_{11}

0: Padding character for adjustment of the data length
S: Number system character
$X_{7\text{-}11}$: Add-on code data

EAN-13

You can select whether or not to transmit the two prefix characters "P_1" and "P_2" and a check digit to the host. The conversion to the ISBN/ISSN format is selectable. Enabling the conversion allows EAN-13 code with prefix characters 978 or 979 to be converted into the ISBN format, and EAN-13 code with prefix characters 977, into the ISSN format.

The conversion to the GTIN format is also selectable. For the GTIN format conversion, refer to Section 8.3.

When the conversion to the GTIN format is disabled, the following formats apply.

- Conversion to ISBN/ISSN disabled

$P_1\ P_2\ P_3\ X_1\ X_2\ X_3\ X_4\ X_5\ X_6\ X_7\ X_8\ X_9$ C/D

P*n*: Prefix characters

- Conversion to ISBN/ISSN enabled

To the ISBN format

$X_1\ X_2\ X_3\ X_4\ X_5\ X_6\ X_7\ X_8\ X_9$ C/D $^{(*1)}$

To the ISSN format

$X_1\ X_2\ X_3\ X_4\ X_5\ X_6\ X_7$ C/D $^{(*1)}$

$^{(*1)}$ Check digits in the ISBN/ISSN format are calculated (MOD-11) and transferred to the host.

EAN-13 with add-on

A code ID mark precedes add-on code data under the conditions "Code ID mark: Type 4" and "Code ID mark output mode: Separating." (For details about the code ID mark, refer to (5) Code ID mark on pages 42 to 46.)

The conversion to the GTIN format is selectable. For the GTIN format conversion, refer to Section 8.3.

When the conversion to the GTIN format is disabled, the following formats apply.

With 2-digit add-on:

$P_1\ P_2\ P_3\ X_1\ X_2\ X_3\ X_4\ X_5\ X_6\ X_7\ X_8\ X_9$ C/D $X_{10}\ X_{11}$

With 5-digit add-on:

$P_1\ P_2\ P_3\ X_1\ X_2\ X_3\ X_4\ X_5\ X_6\ X_7\ X_8\ X_9$ C/D $X_{10}\ X_{11}\ X_{12}\ X_{13}\ X_{14}$

P*n*: Prefix characters
$X_{10\text{-}14}$: Add-on code data

EAN-8

You can select whether or not to transmit a check digit to the host. The conversion to EAN-13 is selectable.

The conversion to the GTIN format is also selectable. For the GTIN format conversion, refer to Section 8.3.

When the conversion to the GTIN format is disabled, the following formats apply.

- Conversion to EAN-13 disabled

$P_1\ P_2\ P_3\ X_1\ X_2\ X_3\ X_4$ C/D

- Conversion to EAN-13 enabled

0 0 0 0 0 $P_1\ P_2\ P_3\ X_1\ X_2\ X_3\ X_4$ C/D

P*n*: Prefix characters

EAN-8 with add-on

A code ID mark precedes add-on code data under the conditions "Code ID mark: Type 4" and "Code ID mark output mode: Separating." (For details about the code ID mark, refer to (5) Code ID mark on pages 42 to 46.)

The conversion to the GTIN format is selectable. For the GTIN format conversion, refer to Section 8.3.

When the conversion to the GTIN format is disabled, the following formats apply.

With 2-digit add-on:
P_1 P_2 P_3 X_1 X_2 X_3 X_4 C/D X_5 X_6

With 5-digit add-on:
P_1 P_2 P_3 X_1 X_2 X_3 X_4 C/D X_5 X_6 X_7 X_8 X_9

P*n*: Prefix characters
$X_{5\text{-}9}$: Add-on code data

Code 39

Code data read will be transmitted as is.

You can select whether or not to transmit start and stop codes ("*").

Interleaved 2of5, Standard 2of5

The scanner transmits code data read, starting from the character following the start code to the one preceding the stop code. No start/stop codes will be transmitted.

Codabar (NW-7)

The scanner transmits code data read including the start/stop codes. You can select whether or not to transmit start/stop codes.

Code 128 (GS1-128 (EAN-128))

The scanner transmits code data read, starting from the character following the start code to the one preceding the check digit. Start/stop codes, FNC codes, or check digit will not be transmitted. Note that FNC1 placed in character positions other than the 1st and 2nd ones from the start code will be converted to GS (1Dh) and transferred.

The conversion to the GTIN format is also selectable. For the GTIN format conversion, refer to Section 8.3.

Code 93

The scanner transmits code data read, excluding start and stop codes and a check digit.

GS1 DataBar (RSS)

Code data read will be transmitted as is.

FNC1 of GS1 DataBar Expanded (RSS Expanded) will be converted to GS(1Dh) and can be selectable from either transferred or user selection.

The conversion to the GTIN format is also selectable. For the GTIN format conversion, refer to Section 9.5.

GS1 DataBar (RSS) Composite symbols

Code data read will be transmitted as is.

Under the conditions “Code ID mark: Type 1” and “Code ID mark output mode: Separating,” a separator (GS: 1Dh) and 2D code ID mark are inserted between the linear component and 2D Composite component. (For details about the code ID mark, refer to (5) Code ID mark)

Under the conditions “Code ID mark: Type 4” and “Linear component length (RSS/EAN-128): Variable,” a separator (GS: 1Dh) is inserted between the linear component and 2D Composite component.

UPC/EAN Composite symbols

Code data read will be transmitted as is.

You can select whether or not to transmit a check digit of the linear component (UPC/EAN).

Under the conditions “Code ID mark: Type 1” and “Code ID mark output mode: Separating,” a separator (GS: 1Dh) and 2D code ID mark are inserted between the linear component and 2D Composite component.

Under the conditions “Code ID mark: Type 2,” the 2D code ID mark is inserted between the linear component and 2D Composite component. (For details about the code ID mark, refer to (5) Code ID mark)

8.4 GTIN Format Conversion

Enabling the GTIN (Global Trade Item Number) format conversion allows UPC-A, UPC-E, EAN-13, EAN-8, and Interleaved 2of5 (14-digit) data to output in the GTIN format. It also allows GS1 DataBar (RSS) and GS1-128 (EAN-128) data in the GTIN format to output in the EAN format (product code format).

Note: Under any of the following conditions, the GTIN format conversion is invalid.

- In scanning bar code types specified for multi-line barcode scanning
- In any of the data edit modes (data extraction mode, data substitution mode, data blocksorting mode, and ADF script mode)

(1) Conversion from UPC/EAN/Interleaved 2of5 (14-digit) to GTIN format

Conversion provides two choices--16- and 14-digit GTIN formats. The former adds the Application Identifier (AI) "01" and Package Indicator PI as a prefix, and the latter, a PI only.

If the GTIN format conversion is enabled, however, the output formats available for UPC-A, UPC-E, EAN-13, and EAN8 do not apply.

UPC-A

- Data read

0 S X_1 X_2 X_3 X_4 X_5 X_6 X_7 X_8 X_9 X_{10} C/D

0: Padding character for adjustment of the data length
S: Number system character

- Conversion to 16-digit GTIN format (AI "01" and PI added)

0 1 PI 0 S X_1 X_2 X_3 X_4 X_5 X_6 X_7 X_8 X_9 X_{10} C/D $^{(*1)}$

$^{(*1)}$ Check digits are calculated again and transferred regardless of the transmission specified.

- Conversion to 14-digit GTIN format (PI added)

PI 0 S X_1 X_2 X_3 X_4 X_5 X_6 X_7 X_8 X_9 X_{10} C/D $^{(*2)}$

$^{(*2)}$ Check digits are calculated again and transferred regardless of the transmission specified.

UPC-A with add-on

- Data read

With 2-digit add-on:

0 S X_1 X_2 X_3 X_4 X_5 X_6 X_7 X_8 X_9 X_{10} C/D X_{11} X_{12}

With 5-digit add-on:

0 S X_1 X_2 X_3 X_4 X_5 X_6 X_7 X_8 X_9 X_{10} C/D X_{11} X_{12} X_{13} X_{14} X_{15}

0: Padding character for adjustment of the data length
S: Number system character
$X_{11\text{-}15}$: Add-on code data

- Conversion to 16-digit GTIN format (AI "01" and PI added)

With 2-digit add-on:

0 1 PI 0 S X_1 X_2 X_3 X_4 X_5 X_6 X_7 X_8 X_9 X_{10} C/D X_{11} X_{12} $^{(*1)}$

With 5-digit add-on:

0 1 PI 0 S X_1 X_2 X_3 X_4 X_5 X_6 X_7 X_8 X_9 X_{10} C/D X_{11} X_{12} X_{13} X_{14} X_{15} $^{(*1)}$

$^{(*1)}$ Check digits are calculated again and transferred regardless of the transmission specified.

- Conversion to 14-digit GTIN format (PI added)

With 2-digit add-on:

PI 0 S X_1 X_2 X_3 X_4 X_5 X_6 X_7 X_8 X_9 X_{10} C/D X_{11} X_{12} (*2)

With 5-digit add-on:

PI 0 S X_1 X_2 X_3 X_4 X_5 X_6 X_7 X_8 X_9 X_{10} C/D X_{11} X_{12} X_{13} X_{14} X_{15} (*2)

(*2) Check digits are calculated again and transferred regardless of the transmission specified.

UPC-E

- Data read

0 X_1 X_2 X_3 X_4 X_5 X_6 C/D

0: Padding character for adjustment of the data length

- Conversion to 16-digit GTIN format (AI "01" and PI added)

X_6=0-2 0 1 PI 0 S X_1 X_2 X_6 0 0 0 0 X_3 X_4 X_5 C/D (*1)
X_6=3 0 1 PI 0 S X_1 X_2 X_3 0 0 0 0 0 X_4 X_5 C/D (*1)
X_6=4 0 1 PI 0 S X_1 X_2 X_3 X_4 0 0 0 0 0 X_5 C/D (*1)
X_6=5-9 0 1 PI 0 S X_1 X_2 X_3 X_4 X_5 0 0 0 0 X_6 C/D (*1)

(*1) Check digits are calculated again and transferred regardless of the transmission specification.

- Conversion to 14-digit GTIN format (PI added)

X_6=0-2 PI 0 S X_1 X_2 X_6 0 0 0 0 X_3 X_4 X_5 C/D (*2)
X_6=3 PI 0 S X_1 X_2 X_3 0 0 0 0 0 X_4 X_5 C/D (*2)
X_6=4 PI 0 S X_1 X_2 X_3 X_4 0 0 0 0 0 X_5 C/D (*2)
X_6=5-9 PI 0 S X_1 X_2 X_3 X_4 X_5 0 0 0 0 X_6 C/D (*2)

(*2) Check digits are calculated again and transferred regardless of the transmission specified.

UPC-E with add-on

- Data read

With 2-digit add-on:

0 X_1 X_2 X_3 X_4 X_5 X_6 C/D X_7 X_8

With 5-digit add-on:

0 X_1 X_2 X_3 X_4 X_5 X_6 C/D X_7 X_8 X_9 X_{10} X_{11}

0: Padding character for adjustment of the data length
$X_{7\text{-}11}$: Add-on code data

- Conversion to 16-digit GTIN format (AI "01" and PI added)

With 2-digit add-on:

X_6=0-2 0 1 PI 0 S X_1 X_2 X_6 0 0 0 0 X_3 X_4 X_5 C/D X_7 X_8 (*1)
X_6=3 0 1 PI 0 S X_1 X_2 X_3 0 0 0 0 0 X_4 X_5 C/D X_7 X_8 (*1)
X_6=4 0 1 PI 0 S X_1 X_2 X_3 X_4 0 0 0 0 0 X_5 C/D X_7 X_8 (*1)
X_6=5-9 0 1 PI 0 S X_1 X_2 X_3 X_4 X_5 0 0 0 0 X_6 C/D X_7 X_8 (*1)

With 5-digit add-on:

X_6=0-2 0 1 PI 0 S X_1 X_2 X_6 0 0 0 0 X_3 X_4 X_5 C/D X_7 X_8 X_9 X_{10} X_{11} (*1)
X_6=3 0 1 PI 0 S X_1 X_2 X_3 0 0 0 0 0 X_4 X_5 C/D X_7 X_8 X_9 X_{10} X_{11} (*1)
X_6=4 0 1 PI 0 S X_1 X_2 X_3 X_4 0 0 0 0 0 X_5 C/D X_7 X_8 X_9 X_{10} X_{11} (*1)
X_6=5-9 0 1 PI 0 S X_1 X_2 X_3 X_4 X_5 0 0 0 0 X_6 C/D X_7 X_8 X_9 X_{10} X_{11} (*1)

(*1) Check digits are calculated again and transferred regardless of the transmission specified.

- Conversion to 14-digit GTIN format (PI added)

With 2-digit add-on:

X_6=0-2 PI 0 S X_1 X_2 X_6 0 0 0 0 X_3 X_4 X_5 C/D X_7 X_8 (*2)
X_6=3 PI 0 S X_1 X_2 X_3 0 0 0 0 0 X_4 X_5 C/D X_7 X_8 (*2)
X_6=4 PI 0 S X_1 X_2 X_3 X_4 0 0 0 0 0 X_5 C/D X_7 X_8 (*2)
X_6=5-9 PI 0 S X_1 X_2 X_3 X_4 X_5 0 0 0 0 X_6 C/D X_7 X_8 (*2)

With 5-digit add-on:

X_6=0-2 PI 0 S X_1 X_2 X_6 0 0 0 0 X_3 X_4 X_5 C/D X_7 X_8 X_9 X_{10} X_{11} (*2)
X_6=3 PI 0 S X_1 X_2 X_3 0 0 0 0 0 X_4 X_5 C/D X_7 X_8 X_9 X_{10} X_{11} (*2)
X_6=4 PI 0 S X_1 X_2 X_3 X_4 0 0 0 0 0 X_5 C/D X_7 X_8 X_9 X_{10} X_{11} (*2)
X_6=5-9 PI 0 S X_1 X_2 X_3 X_4 X_5 0 0 0 0 X_6 C/D X_7 X_8 X_9 X_{10} X_{11} (*2)

(*2) Check digits are calculated again and transferred regardless of the transmission specified.

EAN-13

- Data read

P_1 P_2 P_3 X_1 X_2 X_3 X_4 X_5 X_6 X_7 X_8 X_9 C/D

P*n*: Prefix characters

- Conversion to 16-digit GTIN format (AI "01" and PI added)

0 1 PI P_1 P_2 P_3 X_1 X_2 X_3 X_4 X_5 X_6 X_7 X_8 X_9 C/D (*1)

(*1) Check digits are calculated again and transferred regardless of the transmission specified.

- Conversion to 14-digit GTIN format (PI added)

PI P_1 P_2 P_3 X_1 X_2 X_3 X_4 X_5 X_6 X_7 X_8 X_9 C/D (*2)

(*2) Check digits are calculated again and transferred regardless of the transmission specified.

EAN-13 with add-on

- Data read

With 2-digit add-on:

P_1 P_2 P_3 X_1 X_2 X_3 X_4 X_5 X_6 X_7 X_8 X_9 C/D X_{10} X_{11}

With 5-digit add-on:

P_1 P_2 P_3 X_1 X_2 X_3 X_4 X_5 X_6 X_7 X_8 X_9 C/D X_{10} X_{11} X_{12} X_{13} X_{14}

P*n*: Prefix characters
$X_{10\text{-}14}$: Add-on code data

- Conversion to 16-digit GTIN format (AI "01" and PI added)

With 2-digit add-on:

0 1 PI P_1 P_2 P_3 X_1 X_2 X_3 X_4 X_5 X_6 X_7 X_8 X_9 C/D X_{10} X_{11} (*1)

With 5-digit add-on:

0 1 PI P_1 P_2 P_3 X_1 X_2 X_3 X_4 X_5 X_6 X_7 X_8 X_9 C/D X_{10} X_{11} X_{12} X_{13} X_{14} (*1)

(*1) Check digits are calculated again and transferred regardless of the transmission specified.

- Conversion to 14-digit GTIN format (PI added)

With 2-digit add-on:

PI P_1 P_2 P_3 X_1 X_2 X_3 X_4 X_5 X_6 X_7 X_8 X_9 C/D X_{10} X_{11} (*2)

With 5-digit add-on:

PI P_1 P_2 P_3 X_1 X_2 X_3 X_4 X_5 X_6 X_7 X_8 X_9 C/D X_{10} X_{11} X_{12} X_{13} X_{14} (*2)

(*2) Check digits are calculated again and transferred regardless of the transmission specified.

EAN-8

- Data read

P_1 P_2 P_3 X_1 X_2 X_3 X_4 X_5 C/D

P*n*: Prefix characters

- Conversion to 16-digit GTIN format (AI "01" and PI added)

0 1 PI 0 0 0 0 0 P_1 P_2 P_3 X_1 X_2 X_3 X_4 C/D (*1)

(*1) Check digits are calculated again and transferred regardless of the transmission specified.

- Conversion to 14-digit GTIN format (PI added)

PI 0 0 0 0 0 P_1 P_2 P_3 X_1 X_2 X_3 X_4 C/D (*2)

(*2) Check digits are calculated again and transferred regardless of the transmission specified.

EAN-8 with add-on

- Data read

With 2-digit add-on:

P_1 P_2 P_3 X_1 X_2 X_3 X_4 C/D X_5 X_6

With 5-digit add-on:

P_1 P_2 P_3 X_1 X_2 X_3 X_4 C/D X_5 X_6 X_7 X_8 X_9

P*n*: Prefix characters
$X_{5\text{-}9}$: Add-on code data

- Conversion to 16-digit GTIN format (AI "01" and PI added)

With 2-digit add-on:

0 1 PI 0 0 0 0 0 P_1 P_2 P_3 X_1 X_2 X_3 X_4 C/D X_5 X_6 (*1)

With 5-digit add-on:

0 1 PI 0 0 0 0 0 P_1 P_2 P_3 X_1 X_2 X_3 X_4 C/D X_5 X_6 X_7 X_8 X_9 (*1)

(*1) Check digits are calculated again and transferred regardless of the transmission specified.

- Conversion to 14-digit GTIN format (PI added)

With 2-digit add-on:

PI 0 0 0 0 0 P_1 P_2 P_3 X_1 X_2 X_3 X_4 C/D X_5 X_6 (*2)

With 5-digit add-on:

PI 0 0 0 0 0 P_1 P_2 P_3 X_1 X_2 X_3 X_4 C/D X_5 X_6 X_7 X_8 X_9 (*2)

(*2) Check digits are calculated again and transferred regardless of the transmission specified.

Interleaved 2 of 5(14-digit)

- Data read

X_1 X_2 X_3 X_4 X_5 X_6 X_7 X_8 X_9 X_{10} X_{11} X_{12} X_{13} C/D

- Conversion to GTIN format (AI "01" added)

0 1 X_1 X_2 X_3 X_4 X_5 X_6 X_7 X_8 X_9 X_{10} X_{11} X_{12} X_{13} C/D (*1)

(*1) Check digits are calculated again and transferred regardless of the transmission specified.

(2) Conversion from GS1 DataBar (RSS)/GS1-128 (EAN-128) in GTIN format to EAN format

GS1 DataBar (RSS) or GS1-128 (EAN-128) data read in the GTIN format (16-digit with AI “01”) can be converted to the EAN format if the conversion is enabled. The conversion provides two choices--13- or 14-digit EAN formats. The former trims the Application Identifier (AI) “01” and Package Indicator PI, and the latter, a PI only.

GS1 DataBar (RSS)

- Data read

0 1 PI X_1 X_2 X_3 X_4 X_5 X_6 X_7 X_8 X_9 X_{10} X_{11} X_{12} C/D

PI: Package indicator

- Conversion to 13-digit EAN format (AI “01” and PI trimmed)

X_1 X_2 X_3 X_4 X_5 X_6 X_7 X_8 X_9 X_{10} X_{11} X_{12} C/D $^{(*1)}$

$^{(*1)}$ Check digits are calculated again and transferred regardless of the transmission specified. If the transmission of a code ID mark is enabled in the scanner, the code ID mark of EAN-13 is transferred.

- Conversion to 14-digit EAN format (AI “01” trimmed)

PI X_1 X_2 X_3 X_4 X_5 X_6 X_7 X_8 X_9 X_{10} X_{11} X_{12} C/D

GS1-128 (EAN-128)

- Data read

0 1 PI X_1 X_2 X_3 X_4 X_5 X_6 X_7 X_8 X_9 X_{10} X_{11} X_{12} X_{13} C/D

PI: Package indicator

- Conversion to 13-digit EAN format (AI “01” and PI trimmed)

X_1 X_2 X_3 X_4 X_5 X_6 X_7 X_8 X_9 X_{10} X_{11} X_{12} X_{13} C/D $^{(*1)}$

$^{(*1)}$ Check digits are calculated again and transferred regardless of the transmission specified. If the transmission of a code ID mark is enabled in the scanner, the code ID mark of EAN-13 is transferred.

- Conversion to 14-digit EAN format (AI “01” trimmed)

PI X_1 X_2 X_3 X_4 X_5 X_6 X_7 X_8 X_9 X_{10} X_{11} X_{12} X_{13} C/D

8.5 Data Packaging (Packetizing)

Data packaging is available to boost the reliability of data transfers over the Bluetooth® wireless link from the scanner to commercially available Bluetooth® device, or other target device.

Data packaging wraps the transfer data in packets with the following format. After sending a packet, the scanner waits for a response from the target device. ACK indicates a successful transfer; NAK represents a request to resend.

The scanner configuration software (ScannerSetting_2D) provides ACK/NAK timeout settings from 100 to 9900 ms in 100 ms intervals.

If there is no response within the specified time limit, the scanner sounds the error beep to indicate that the data transfer was unsuccessful. The scanner cannot read in a new code while it is waiting for a response.

This functionality provides a scanner operator working some distance from the host with better information as to whether the transfer data has been correctly transmitted to the host. Note, however, that wireless communications are such that the scanner can sometimes fail to receive ACK (or NAK) responses even when the data has been correctly transmitted. It is therefore important to use the scanner in an environment supporting stable wireless communications.

■ Data transmission format

Header		Number of data bytes	Container number	Spare	Transfer data	CRC		Terminator	
DLE	STX					Lower half	Upper half	DLE	ETX

The following describes each field in detail.

(1) Header (2 bytes)

This data sequence indicates the start of data packaging (packetizing).

(2) Number of data bytes (2 bytes)

This specifies the number of data bytes in the packet. This number includes everything from the header to the terminator.

(3) Container number (1 bytes)

Upper 4bit : transmission number, Under 4bit : All transmission numbers

(4) Spare (1 bytes)

This field is for future expansion. The value is currently fixed at 00h.

(5) Transfer data

This is the data before packetized.

(6) CRC (2 bytes)

This 16-bit CRC is calculated from the "Number of data bytes" through "Transfer data" using the CCITT CRC polynomial x16+x12+x5+1. The two bytes appear in little-endian order: LSB first, MSB second.

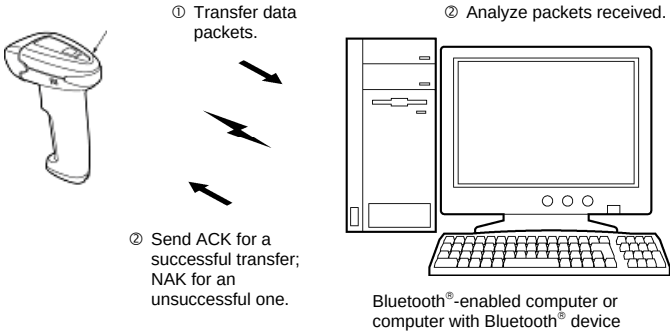
(7) Terminator (2 bytes)

This data sequence indicates the end of data packaging (packetizing).

Note: If DLE (10h) is contained in the data anywhere else other than in the header or terminator, it will be preceded by another DLE in data transfer. If the connection target is other than the communications adapter in data packaging, it is necessary to delete the added DLE in CRC calculation or data retrieval.

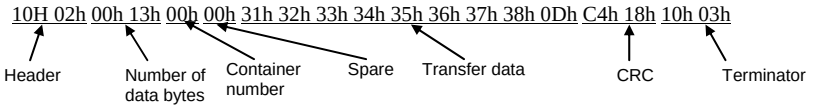
Using scanner connected to other than communications adapter

Scanner settings: Data packaging mode (to host)


① Transfer data packets.
② Analyze packets received.
② Send ACK for a successful transfer; NAK for an unsuccessful one.
Bluetooth®-enabled computer or computer with Bluetooth® device

Example of analysis for packet received

Data received (hexadecimal)



(1) Compare data lengths.

Data length received in packet: 0013h = 19 bytes
Data received in packet: 19 bytes

(2) Compare CRCs.

1) Initialize CRC to 0.
2) Retrieve the first data byte (00h).
3) Shift the current CRC value one bit to the left. If the shift produces overflow, XOR the result with 1021h.
4) Shift the data byte one bit to the left. If the shift produces overflow, XOR the current CRC value with 0001h.
5) Repeat steps 3) and 4) a total of 8 times.
6) Retrieve the second data byte (13h).
7) Repeat steps 3) and 4) a total of 8 times.
8) Repeat this calculation through to the final byte.
9) Finally repeat the calculation for the two bytes (C4h 18h) in the CRC storage area, but reverse them first because the 16-bit CRC is stored in little-endian order.

Data	CRC
--	0000h
00h	0000h
13h	1300h
00h	0013h
00h	221Ah
31h	8EF9h
32h	58C0h
33h	F554h
34h	2054h
35h	2181h
36h	A3A0h
37h	92A9h
38h	0059h
0Dh	C244h
18h	1CE2h
C4h	0000h

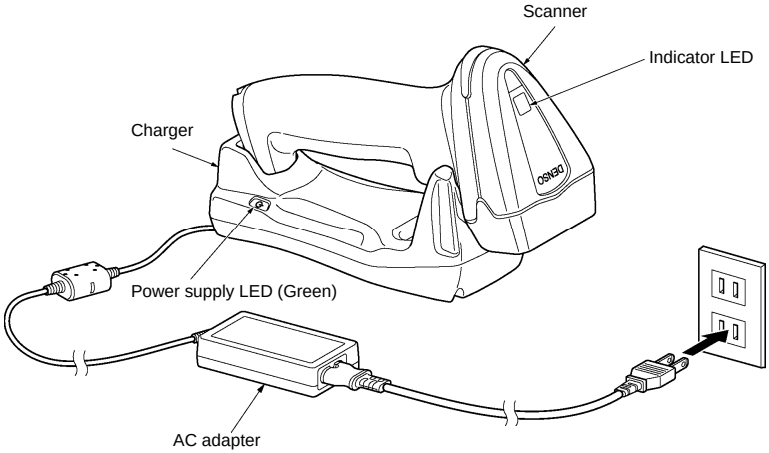
(3) A result of 0000h indicates a successful transfer; a nonzero one, an error.

Chapter 9 Charging and Replacing the Battery Cartridge

The scanner sounds a warning when the charge is low. Immediately recharge the battery cartridge.

Some heat generation in the scanner unit or charger during charging is perfectly normal.

9.1 Charging the Battery Cartridge



■ **Important notes on care and handling**

- Use the charger only in locations satisfying the following conditions.
  - Ambient temperature of 10 to 40°C
  - Humidity of 20% to 80%
  - No dust or excessive vibration
  - No splashing of water or other liquids
- Do not leave the charger in direct sunlight, in an automobile, or other location exposed to high temperatures.
- Keep the charger away from telephones, television sets, radios, and other equipment sensitive to electromagnetic noise.
- Disconnect the charger from the electrical outlet when not in use.
- Occasionally clean the charging pins with a dry cotton swab or similar material. Allowing foreign matter to accumulate can interfere with proper charging.

■ **Charging procedure**

(1) Connect the AC adapter to the charger and then plug it into an electrical outlet.

Confirm that the charger's green power supply LED lights.

(2) Place the scanner in the charger.

The scanner's indicator LED turns red, indicating the start of charging.

When charging is complete, approximately 2.5 hours later, the charge LED goes off and the indicator LED turns green.

(3) Remove the scanner from the charger and unplug the AC adapter from the electrical outlet.

Operation and Status	Scanner's indicator LED
Place the scanner in the charger.	Red
↓	
Charging starts.	Red
↓ Approximately 2.5 hours later	
Charging complete.	Green

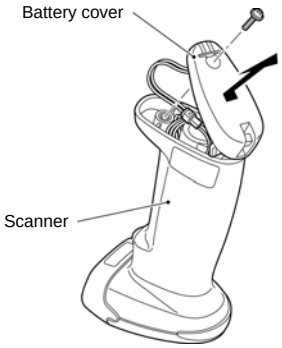
9.2 Replacing the Battery Cartridge

The rechargeable battery cartridge is a consumable part with a finite service life. It is time to replace it when a full charge lasts a significantly shorter time than previously. Note that the service life varies with usage conditions

Follow the replacement procedure given below also when it is necessary to take the battery cartridge out of the scanner due to any scanner trouble.

(1) Remove the screw that secures the battery cover.

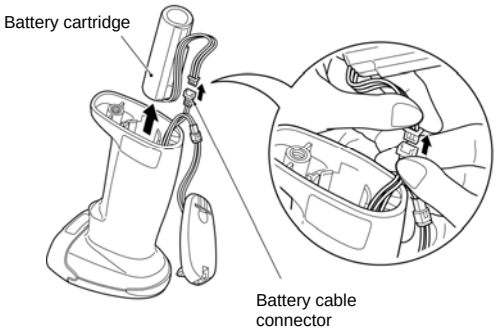
(2) Open the battery cover gently that is connected with the cable.



(3) The battery cartridge out of the scanner.

(4) Disconnect the battery cable connector.

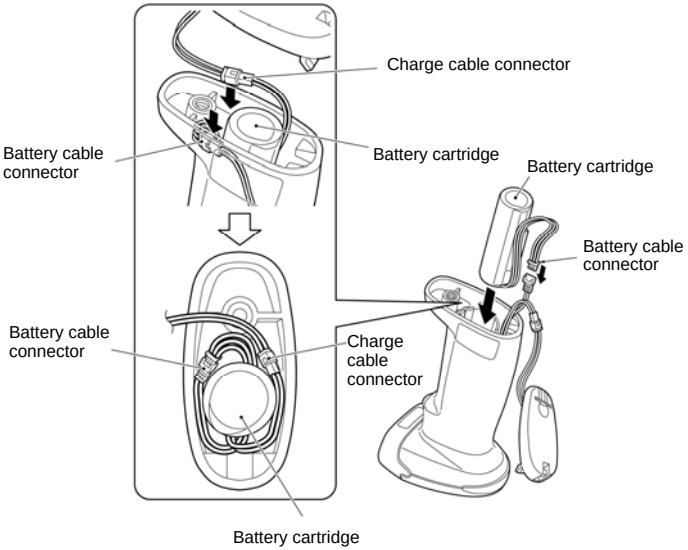
Note: When disconnecting the cable connector, be sure to hold the connector housings as shown below. Do not pull the cables; doing so will result in broken wires.



(5) Connect a new battery cartridge to the battery cable connector.

(6) Insert the new battery cartridge into the scanner.

(7) Route the cables in the space around the battery cartridge, close the battery cover, and secure it with the screw, taking care not to pinch the cables between the casing and the battery cover.



Note: After replacement of the battery cartridge, be sure to charge it.

Note: Do not peel off the protection film covering the battery cartridge.

9.3 Recycling the Battery Cartridge

The Li-ion battery inside the rechargeable battery cartridge contains recyclable rare elements, so please recycle by returning the spent rechargeable battery cartridge to the nearest shop collecting rechargeable batteries for recycling or contacting your nearest distributor.

Li-ion

Always observe the following safety precautions before throwing the spent rechargeable battery cartridge into the recycle box.

- Cover the terminals with cellophane tape or other insulating material to prevent a short circuit, which risks heat generation or fire.
- Do not remove the tubing, plastic wrapping, or other material covering the battery.
- Do not disassemble the rechargeable battery cartridge.

Chapter 10 Image Capturing

10.1 Outline

The scanner supports image capturing that allows you to capture a graphic as a bitmap (BMP) or JPEG image and output it to the host computer. The JPEG image offers three quality choices--standard, high, and low.

The image size can be selected from standard WVGA, 1/4 WVGA and 1/16 WVGA. If you select 1/4 WVGA or 1/16 WVGA, select also the output image area--the full image area or the center portion of the image area. When the full image area is selected, the scanner thins out the resolution of the full image area by skipping every other pixel so that the image quality becomes low; when the center portion is selected, the scanner extracts the center portion of the image area so that the visual area becomes smaller but the image quality does not change.

The scanner can also output a thumbnail to help you aim at a target. The thumbnail images can be saved as a BMP or JPEG image in 1/64 WVGA or 1/4 WVGA, respectively.

You can select the output format, image size, output image area and whether or not to use a thumbnail by modifying the parameters of the IMAGEOUT command.

Note: Selecting the HID profile disables the image capturing function.

10.2 Image Capturing Specifications

(1) Output file format

BMP or JPEG file format

(2) Image size and output image area

Image size	Number of pixels	BMP	JPEG	Image output area
Standard WVGA	752 x 480	√	√	Full image area
1/4 WVGA	376 x 240	√	√	Full or center portion of the image area
1/16 WVGA	188 x 120	√	√	Full or center portion of the image area
Thumbnail (1/64 WVGA)	94 x 60	√	--	Full image area
Thumbnail (1/4 WVGA)	376 x 240	--	√	Full image area

(3) Communications protocol for image transmission

Xmodem 1K

(4) Image output command

IMAGEOUT#1#m#n Enable the thumbnail transmission
IMAGEOUT#1#m#n#o Disable the thumbnail transmission

The selections available for parameters l, m, n and o are as follows:

l: Output file format

B	BMP
J or J0	JPEG (Medium)
J1	JPEG (High)
J2	JPEG (Low)

m: Image size

0	Standard VGA
2	1/4 VGA
4	1/16 VGA

n: Image output area

F	Full image area
C	Center portion of the image area

o: Thumbnail

0	Disable thumbnail transmission
1	Enable thumbnail transmission of BMP images in 1/64 VGA
2	Enable thumbnail transmission of JPEG images in 1/4 VGA

(5) Image capturing operation

1) Upon receipt of an IMAGEOUT command, the scanner captures an image, beeps three times, and switches to the image transmission mode (Xmodem 1K protocol).

2) When the thumbnail is enabled:

   The scanner transmits a thumbnail (BMP file in 1/64 WVGA or JPEG file in 1/4 WVGA) repeatedly.

   Pressing the trigger switch causes the scanner to beep once, capture an image, and start transmission (Xmodem 1K protocol).

   When the thumbnail is disabled:

   The scanner immediately captures an image and transmits it in the format specified by IMAGEOUT parameters (Xmodem 1K protocol).

3) Upon completion of transmission, the scanner beeps once and exits the image transmission mode.

(6) Notes

- Image transmission can only be command-controlled; it cannot be started by the QR-coded parameter menu.
- When the scanner is in the image transmission mode, it cannot scan bar codes or 2D codes. The protocol is fixed to the Xmodem 1K.
- Parameters of the IMAGEOUT command should be uppercase or numerical ASCII characters.
- Transmission condition settings such as header, terminator and transmission speed for the image transmission are the same as those for ordinary commands.
- Transmission speed and other conditions when the Xmodem 1K protocol is used are the same as those with the normal communications protocol (non-acknowledge mode or ACK/NAK mode).
- Upon completion of image transmission, the scanner returns to the normal communications protocol (non-acknowledge mode or ACK/NAK mode).
- In a JPEG file format, images are compression-converted, so the image quality may be lower.

(7) Image transmission time required (Typical)

The table below lists the typical image transmission time required from image capturing to conversion and transmission under the following conditions:

Communications adapter BA11/10-RKU using the RS-232C interface
Communications protocol: Xmodem 1K
Transmission speed: 115200 bps

However, this may vary according to the Bluetooth® radio wave state and the settings made in the host computer.

Image type	Output file format	Image file size	Image transmission time
Standard WVGA	BMP	353 KB	76 sec.
1/4 WVGA	BMP	89.2 KB	20 sec.
1/16 WVGA	BMP	23.1 KB	5.3 sec.
Thumbnail (1/64 WVGA)	BMP	6 KB	2.1 sec.
Thumbnail (1/4 WVGA)	JPEG	4.8 KB	2.0 sec.
Standard WVGA	JPEG	25 KB*	8.3 sec.

* In a JPEG file format, images will be compression-converted, so the file size may vary, depending on images scanned (approx. 10 to 40 KB, normally 25 KB). No compression ratio can be specified.

Chapter 11 Parameters and Defaults

The tables below list the parameters and their defaults. Those parameters can be changed with the QR-coded parameter menu or configuration software (ScannerSetting_2D), except shadowed ones only with the configuration software.

When the scanner leaves the factory, all of these parameters are set to defaults.

(1) Reading modes

Items	Parameters	Defaults	Refer to:
Scanning with Bluetooth® wireless link broken	Scan w/ Bluetooth® link broken		Section 3.2
	Cancel "Scan w/ Bluetooth® link broken"	√	
Scanning modes	Regular read mode	√	Section 6.1
	Data verification mode (n-point verification)		
	Data verification mode (2-point verification)		
Data editing	No editing	√	Section 6.2
	Data extraction mode		
	Data substitution mode		
	Data blocksorting mode		
	ADF script mode		
Point scan mode	Enable		Section 6.3
	Disable	√	
Period of double-read prevention	Double-read enabled		Section 3
	Period of double-read prevention 0.1 to 9.9 seconds	1s	

(2) Communications modes

Items	Parameters	Defaults	Refer to:
Connection target of scanner	BA10/11	√	Section 2.2
	Windows PC/Android		
	iOS (iPhone/iPad)		
Profile	SPP	√	
	HID		
Easy connection setup (See Note 1.)	Windows PC (SPP,HID Profile with PINCODE)		Section 2.2
	Windows PC (SPP,HID Profile without PINCODE)		
	Android (SPP Profile)		
	Android (HID Profile)		
	iOS (iPhone/iPad)		

(Note 1): Can be changed only with the QR-coded parameter menu.

: Can be changed only with the configuration software.

(3) Bluetooth® communications parameters for SPP Profile

Items	Parameters	Defaults	Refer to:
Communications protocol	Non-acknowledge mode	√	Section 8.1 (1)
	ACK/NAK mode		
	Data packaging mode(to host)		
ACK/NAK timeout	0.1～9.9sec	1sec	

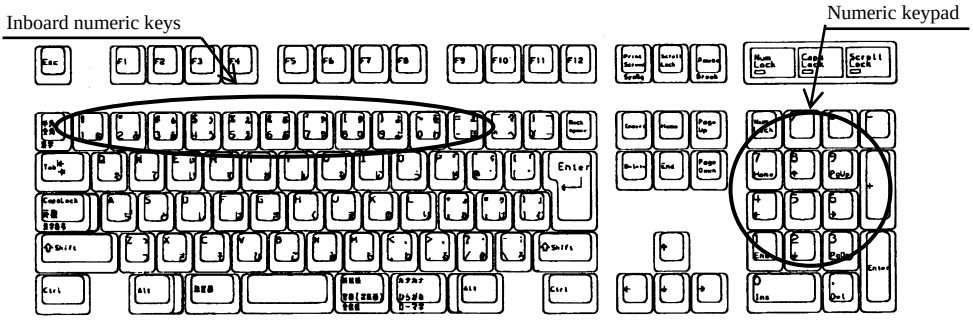
(4) Bluetooth® communications parameters for HID Profile

Items	Parameters	Defaults	Refer to:
CAPS mode	Manual	√	Section 8.2 (1) (See Note 1.)
	Auto		
Host's CAPS LOCK status	OFF (Lowercase letter)	√	Section 8.2 (1) (See Note 1.)
	ON (Uppercase letter)		
Keyboard type	U.S. English (101 key type)		Section 8.2 (2)
	Germany (102 key type)		
	French (102 key type)		
	U.K. English (102 key type)		
	Italian (102 key type)		
	Swedish (102 key type)		
	Japanese (106 key type)	√	
Numeric key selection (0 to 9)	Inboard numeric keys	√	Section 8.2 (3) (See Note 3.)
	Numeric keypad		
Binary data conversion (See Note 2.)	None (ASCII)	√	Section 8.2 (4)
	Binary conversion		
	Kanji conversion		

(Note 1) Select the Caps Lock state that matches host's keyboard state.

(Note 2) Some applications cannot output data correctly on the display.

(Note 3) When selecting "Numeric keypad for the numeric data transmission format, set the host's NUM LOCK to ON.



: Can be changed only with the configuration software.

Items	Parameters	Defaults	Refer to:
Special key transfer mode	Enable		(See Note 4.)
	Disable	√	
Software keyboard	Enable	√	
	Disable		

(Note 4) Special key transfer applies to the fields except header and terminator in the data transmission format. Enabling this function substitutes E7h to FDh data with the special keys as listed below and transmits the substituted data to the host.

The Left SHIFT, Left CTRL, and Left ALT are transmitted as a simultaneous depression with the subsequent character or key.

Lower \ Upper	E	F
0		↓
1		F1
2		F2
3		F3
4		F4
5		F5
6		F6
7	Left SHIFT	F7
8	Left CTRL	F8
9	Left ALT	F9
A	TAB	F10
B	ESC	F11
C	ENTER	F12
D	←	Right CTRL
E	↑	
F	→	

Special Key Substitution Table

(5) Bluetooth® communications parameters

Items	Parameters	Defaults	Refer to:
Configure the scanner as master or slave	As a master		Section 2.2
	As a slave	√	
	No slave/master configuration change		
Connection target of scanner as master	Bluetooth® address	√	Section 2.2
	Local name		
	Communications adapter (BA11/10-RKU)		
Specification of connection target's address	Connection target's address	None	Section 2.2
Timeout period for slave to wait for a connection request	2 minutes	√	Section 8.1 (2)
	4 minutes		
	10 minutes		
	30 minutes		
Clear the transfer buffer when the Bluetooth link is broken	Enable		
	Disable	√	
Bluetooth® interface	Start operation	√	Section 2.1 (See Note 1.)
	End operation		
PIN code	1 to 8 digits alphanumeric characters or symbols	1234	
Security function	Enable	√	
	Disable		
Local Class of Device	Unclassified device	√	
	Keyboard		

(Note 1) The factory default is "End operation."

: Can be changed only with the configuration software.

(6) Data transmission format for SPP Profile

Items	Parameters	Defaults	Refer to:
Header	None	√	Section 8.3 (1)
	STX		
	User-defined		
Terminator	None		
	ETX		
	CR	√	
	LF		
	CR LF		
	User-defined		
Transmission of BCC	Enabled		Section 8.3 (1) (See Note 1.)
	Disabled	√	

(Note 1) No BCC will be transferred if no header is prefixed.

: Can be changed only with the configuration software.

(7) Data transmission format for HID Profile

Items	Parameters	Defaults	Refer to:
Header	NONE	√	Section 8.3, (1)
	STX		
	ETX		
	CR		
	LF		
	CR LF		
	TAB		
	ESC		
	ENTER		
	Right Ctrl		
	←		
	↑		
	→		
	↓		
	User-defined		
Terminator	NONE		
	STX		
	ETX		
	CR		
	LF		
	CR LF		
	TAB		
	ESC		
	ENTER	√	
	Right Ctrl		
	←		
	↑		
	→		
	↓		
	User-defined		

: Can be changed only with the configuration software.

(8) Data transmission format common to all interfaces

Items	Parameters	Defaults	Refer to:
Transmission of code ID mark	Enable		Section 8.3
	Disable	√	
Code ID mark position	Before prefix		Section 8.3
	After prefix	√	
Code ID mark	Type 1 (DENSO1)	√	Section 8.3, (5)
	Type 2 (DENSO2)		
	Type 3		
	Type 4		
	User-defined		
Code ID mark output mode	Coupling	√	Section 8.3, (5)
	Separating		
Transmission of the number of digits (not applicable to UPC/EAN codes)	Enable, in 4 digits		Section 8.3, (6)
	Enable, in 2 digits		
	Disable	√	
Prefix transmission	Enable		Section 8.3, (2)
	Disable	√	
Suffix transmission	Enable		
	Disable	√	
Scanner ID output	Enable		Section 8.3, (4)
	Disable	√	
GTIN format conversion	Enable		Section 8.4
	Disable	√	
Conversion type from UPC/EAN/ Interleaved 2of5 (14-digit) to GTIN format	Conversion to 16 digits	√	
	Conversion to 14 digits		
	Conversion prohibited		
Conversion type from GS1 DataBar (RSS)/GS1-128 (EAN-128) in GTIN format to EAN format	Conversion to 14 digits	√	
	Conversion to 13 digits		
	Conversion prohibited		
Prefix PI in conversion from UPC/EAN/ Interleaved 2of5 (14-digit) to GTIN format	0 to 9	0	

(Note 1) No BCC will be transferred if no header is prefixed.

: Can be changed only with the configuration software.

(9) 2D codes, mirror image, black-and-white inverted codes and SQRC

Items	Parameters	Defaults	Refer to:
Reading mirror image codes	Enable		Section 7.4
	Disable	√	
Reading black-and-white inverted codes	Black cells/bars on a white background	√	Section 7.5
	White cell/bars on a black background		
	Auto detection of black and white inverted codes		
Edit/Non-edit mode for Structured Appended QR Code	Edit mode	√	Section 7.6
	Batch edit mode		
	Non-edit mode		
Reading MicroQR	Enable	√	Section 12.2
	Disable		
Reading PDF417	Enable	√	
	Disable		
Reading MicroPDF417	Enable		
	Disable	√	
Reading MaxiCode	Enable	√	
	Disable		
Reading DataMatrix (Square)	Enable	√	Section 12.2 (See Note 1.)
	Disable		
Reading DataMatrix (Rectangular)	Enable	√	
	Disable		
QR Code, minimum version readable	1 to 40	1	Section 12.2 (See Note 2.)
QR Code, maximum version readable		40	
MicroQR, minimum version readable	1 to 4	1	
MicroQR, maximum version readable		4	
Data Matrix (Square), minimum code number readable	1 to 24	1	
Data Matrix (Square), maximum code number readable		24	
Data Matrix (Rectangular), minimum code number readable	1 to 6	1	
Data Matrix (Rectangular), maximum code number readable		6	

(Note 1) Using the QR-coded parameter menu enables or disables scanning of both Square and Rectangular Data Matrix symbols at the same time.

(Note 2) The parameter setting ranges are different from versions or code numbers that the scanner can actually read.

: Can be changed only with the configuration software.

Items	Parameters	Defaults	Refer to:
Reading SQRC	Enable (SQRC and QR Code symbols)		Section 7.8
	Enable (SQRC symbol only)		
	Disable	√	
SQRC Encryption key mismatch	Reading disabled	√	
	Enable transmission of disclosure data only		
SQRC Encryption key match	Enable transmission of disclosed data + undisclosed data	√	
	Enable transmission of undisclosed data only		
SQRC Code, minimum version readable	Setting range 1-40	1	Section 12.2
SQRC Code, maximum version readable		40	(See Note 1.)
Reading iQR Code (square)	Enable		Section 12.2
	Disable	√	
iQR Code, (square) minimum version readable	Setting range 1-61	1	Section 12.2 (See Note 1.)
iQR Code, (square) maximum version readable		61	
Reading iQR Code (rectangular)	Enable		Section 12.2
	Disable	√	
iQR Code, (rectangular) minimum version readable	Setting range 1-15	1	Section 12.2 (See Note 1.)
iQR Code, (rectangular) maximum version readable		15	
Edit/Non-edit mode for Structured Appended iQR Code	Edit mode	√	Section 7.6
	Non-edit mode		
Reading Aztec (Full Range)	Enable		Section 12.2
	Disable	√	
Reading Aztec (Compact)	Enable		
	Disable	√	
Aztec, (Full range) minimum version readable	Setting range 1-32	1	Section 12.2 (See Note 1.)
Aztec, (Full range) maximum version readable		32	
Aztec, (Compact) minimum version readable	Setting range 1-4	1	
Aztec, (Compact) maximum version readable		4	

(Note 1) The parameter setting ranges are different from versions or code numbers that the scanner can actually read.

: Can be changed only with the configuration software.

(10) Bar codes

UPC-A/E, EAN-13/8

Items	Parameters	Defaults	Refer to:
Scanning UPC-A and EAN-13	Enable	√	Sections 9.4 and 12.2
	Disable		
UPC-A transmission of check digit	Enable	√	Sections 9.4 and 12.2
	Disable		
UPC-A transmission of number system character	Enable	√	
	Disable		
UPC-A transmission of the leading character	Enable	√	
	Disable		
EAN-13 transmission of check digit	Enable	√	
	Disable		
EAN-13 transmission of country code	Enable	√	Sections 9.4 and 12.2 (See Note 1.)
	Disable		
EAN-13 conversion to the ISBN / ISSN format	Enable		Sections 9.4 and 12.2
	Disable	√	
Reading UPC-E	Enable	√	
	Disable		
UPC-E transmission of check digit	Enable	√	
	Disable		
UPC-E transmission of the leading character	Enable		
	Disable	√	
UPC-E transmission of number system character	Enable	√	
	Disable		
UPC-E conversion to the UPC-A format	Enable		
	Disable	√	

(Note 1) A country code is in the upper two digits of the prefix character field in EAN-13.

: Can be changed only with the configuration software.

Items	Parameters	Defaults	Refer to:
Reading EAN-8	Enable	√	Sections 9.4 and 12.2
	Disable		
EAN-8 transmission of check digit	Enable	√	Sections 9.4 and 12.2
	Disable		
EAN-8 Conversion to the EAN-13 format	Enable		
	Disable	√	
Reading UPC/EAN with 2-digit add-on	Enable		
	Disable	√	
Reading UPC/EAN with 5-digit add-on	Enable		
	Disable	√	
Reading UPC/EAN with add-on only	Enable		
	Disable	√	
Add-on check level	Disabled checking	√	
	Levels 1 to 4		

Interleaved 2of5

Items	Parameters	Defaults	Refer to:
Reading Interleaved 2of5	Enable, without a check digit	√	Section 12.2
	Enable, with a check digit (Check digit transmission enabled)		
	Enable, with a check digit (Check digit transmission disabled)		
	Disable		
Minimum number of readable digits for Interleaved 2of5	2 to 99 digits	4 digits	(See Note 1.)
Maximum number of readable digits for Interleaved 2of5		99 digits	

(Note 1) The parameter setting ranges are different from the numbers of digits that the scanner can actually read.

Standard 2of5

Items	Parameters	Defaults	Refer to:
Reading Standard 2of5	Enable, without a check digit		Section 12.2
	Enable, with a check digit		
	Disable	√	
Standard 2of5 transmission of check digit	Enable	√	
	Disable		
Minimum number of readable digits for Standard 2of5	3 to 99 digits	3 digits	(See Note 1.)
Maximum number of readable digits for Standard 2of5		99 digits	

(Note 1) The parameter setting ranges are different from the numbers of digits that the scanner can actually read.

: Can be changed only with the configuration software.

Codabar (NW-7)

Items	Parameters	Defaults	Refer to:
Reading Codabar (NW-7)	Enable, without a check digit	√	Section 12.2
	Enable, with a check digit (Check digit transmission enabled)		
	Enable, with a check digit (Check digit transmission disabled)		
	Disable		
Minimum number of readable digits for Codabar (NW-7)	3 to 99 digits (including start/stop codes)	4 digits	(See Note 1.)
Maximum number of readable digits for Codabar (NW-7)		99 digits	
Transmission of Start/Stop codes for Codabar (NW-7)	Transmit a/b/c/d	√	Section 12.2
	Transmit A/B/C/D		
	Disable		
Check digit method for Codabar (NW-7)	MOD-16	√	Section 12.2
	7-check method		

(Note 1) The parameter setting ranges are different from the numbers of digits that the scanner can actually read.

Code 39

Item	Parameters	Defaults	Refer to:
Reading Code 39	Enable, without a check digit	√	Section 12.2
	Enable, with a check digit (Check digit transmission enabled)		
	Enable, with a check digit (Check digit transmission disabled)		
	Disable		
Minimum number of readable digits for Code 39	1 to 99 digits (excluding start/stop codes)	1 digit	(See Note 1.)
Maximum number of readable digits for Code 39		99 digits	
Transmission of Start/Stop codes for Code 39	Enable		Section 12.2
	Disable	√	
Conversion to FULL ASCII	Enable		Section 12.2
	Disable	√	

(Note 1) The parameter setting ranges are different from the numbers of digits that the scanner can actually read.

: Can be changed only with the configuration software.

Code 128, GS1-128 (EAN-128)

Items	Parameters	Defaults	Refer to:
Reading Code 128	Enable	√	Section 12.2 (See Note 2.)
	Disable		
Reading GS1-128 (EAN-128)	Enable	√	
	Disable		
Minimum number of readable digits for Code 128	1 to 99 digits (excluding start/stop codes and 1-digit check digit)	1 digit	(See Note 1.)
Maximum number of readable digits for Code 128		99 digits	
Transmission of FNC1 for Code 128	Disable		Section 12.2
	Transmit GS	√	
	User-defined		
Minimum number of readable digits for GS1-128 (EAN-128)	1 to 99 digits (excluding start/stop codes and 1-digit check digit)	1 digit	(See Note 1.)
Maximum number of readable digits for GS1-128 (EAN-128)		99 digits	
Transmission of FNC1 for GS1-128 (EAN-128)	Disable		Section 12.2
	Transmit GS	√	
	User-defined		

(Note 1) The setting ranges are different from the numbers of digits that the scanner can actually read.

(Note 2) Using the QR-coded parameter menu enables or disables scanning of both Code 128 and GS1-128 (EAN-128) at the same time.

Code 93

Items	Parameters	Defaults	Refer to:
Reading Code 93	Enable		Section 12.2
	Disable	√	
Minimum number of readable digits for Code 93	1 to 99 digits (excluding start/stop codes and 2-digit check digits)	1 digit	(See Note 1.)
Maximum number of readable digits for Code 93		99 digits	

(Note 1) The setting ranges are different from the numbers of digits that the scanner can actually read.

: Can be changed only with the configuration software.

GS1 DataBar (RSS), EAN.UCC Composite symbols

Items	Parameters	Defaults	Refer to:
Reading GS1 DataBar Omnidirectional, GS1 DataBar Truncated, GS1 DataBar Limited, GS1 DataBar Expanded (Note 1)	Enable		Section 12.2
	Disable	√	
Reading GS1 DataBar Stacked, GS1 DataBar Expanded Stacked, GS1 DataBar Stacked Omnidirectional (Note 2)	Enable		
	Disable	√	
Transmission of FNC1 for GS1 DataBar (RSS) Expanded code	Enable		
	Transmit GS	√	
	User-defined		
Reading EAN.UCC Composite symbols	Enable		
	Disable	√	
Reading RSS Composite with CC-A	Enable		
	Disable	√	
Reading RSS Composite with CC-B	Enable		
	Disable	√	
Reading UPC/EAN Composite with CC-A	Enable		
	Disable	√	
Reading UPC/EAN Composite with CC-B	Enable		
	Disable	√	
Reading GS1-128 (EAN-128) Composite with CC-A	Enable		
	Disable	√	
Reading GS1-128 (EAN-128) Composite with CC-B	Enable		
	Disable	√	
Reading GS1-128 (EAN-128) Composite with CC-C	Enable		
	Disable	√	

(Note 1) Indicates GS1 DataBar Omnidirectional (RSS-14), GS1 DataBar Truncated (RSS-14 Truncated), GS1 DataBar Limited (RSS Limited) and GS1 DataBar Expanded (RSS Expanded).

(Note 2) Indicates GS1 DataBar Stacked (RSS-14 Stacked), GS1 DataBar Stacked Omnidirectional (RSS-14 Stacked Omnidirectional) and GS1 DataBar Expanded Stacked (RSS Expanded Stacked).

(Note 3) In the QR Code menu, the GS1 DataBar (RSS codes) cannot separately be selected and they are enabled or disabled all together.

(Note 4) In the QR Code menu, the COMPOSITE codes cannot separately be selected and they are enabled or disabled all together.

: Can be changed only with the configuration software.

Multi-line barcode scanning

Items	Parameters	Defaults	Refer to:
Reading multi-line bar codes	Enable		Section 7.7
	Disable	√	
Number of lines for multi-line barcode scanning	Two lines	√	
	Three lines		
Output format for multi-line bar codes	Header/Terminator-delimited		
	Comma-delimited	√	
First-line barcode	Selectable from readable bar codes	Not specified.	
First-line barcode character	Up to 2 ASCII characters	Not specified.	
First-line barcode minimum number of readable digits	Max. 99 digits	Not specified.	
First-line barcode maximum number of readable digits	Max. 99 digits	Not specified.	
Second-line barcode	Selectable from readable bar codes	Not specified.	
Second-line barcode character	Up to 2 ASCII characters	Not specified.	
Second-line barcode minimum number of readable digits	Max. 99 digits	Not specified.	
Second-line barcode maximum number of readable digits	Max. 99 digits	Not specified.	
Third-line barcode	Selectable from readable bar codes	Not specified.	
Third-line barcode character	Up to 2 ASCII characters	Not specified.	
Third-line barcode minimum number of readable digits	Max. 99 digits	Not specified.	
Third-line barcode maximum number of readable digits	Max. 99 digits	Not specified.	

: Can be changed only with the configuration software.

(11) Trigger switch control

Items	Parameters	Defaults	Refer to:
Trigger switch control mode	Auto-off mode	√	Section 5.1
	Momentary switching mode		
	Momentary switching mode (Reverse Type)		
	Alternate switching mode		
	Continuous reading mode 1		
	Continuous reading mode 2		
	Auto sense mode		Section 5.3
	Auto stand mode		
Auto-off mode reading time (One shot mode)	1s		Section 5.1
	2s		
	3s		
	4s		
	5s	√	
Time from Auto stand mode to Auto sensing mode	1s		Section 5.3
	2s	√	
	3s		
	4s		
	5s		
	6s		
	7s		
	8s		
	9s		
Error issue when reading fails	Enable		Section 5.1
	Disable	√	
Sensibility level	High		Section 5.3
	Medium	√	
	Low		
Break Bluetooth wireless link	Enable	√	Section 2.3
	Disable		

: Can be changed only with the configuration software.

(12) Beeper, indicator LED, marker beam and illumination LEDs

Items	Parameters	Defaults	Refer to:
Beeper control	Enable	√	Section 7.1
	Disable		
Beeping tone	Low beeping tone (2.5 kHz)		
	Medium beeping tone (2.7 kHz)	√	
	High beeping tone (2.9 kHz)		
Beeper beep time	Short (60 ms)		
	Medium (80 ms)	√	
	Long (120 ms)		
Beeper volume	High	√	
	Medium		
	Low		
Scan complete sound	Single beep	√	Section 7.1
	Multiple beep		
Indicator LED control	Enable	√	Section 7.2
	Disable		
Marker	Marker-OFF mode		Section 7.3
	Normal marker mode	√	
	Marker-ON mode		
Beeper sound when power turned ON	Enable		Section 7.1
	Disable	√	
Illumination LED	Turns off		Section 7.4
	Turns on	√	
Power save mode	Enable (Note 1)	√	Section 7.4
	Disable		

(Note1) When “Power save mode” is enabled, a reading distance may be shorter under 500 lx ambient illumination.

: Can be changed only with the configuration software.

(13) Data verification conditions and data editing conditions

Items	Parameters	Defaults	Refer to:
Data to be verified	Data block verification		Section 6.1
	Data string verification	√	
Preset registration	Enable		
	Disable	√	
Verification start position for data string verification	001 to 999 positions (Specify with ASCII characters)	1	
Number of characters to verify for data string verification (without preset master registration)	01 to 99 positions (Specify with ASCII characters)	99	
Position of data block to verify for data block verification	01 to 99 positions (Specify with ASCII characters)	1	
Transmission of verification result for a match (When verification OK)	Disable	√	
	Enable code data transmission		
	Enable OK transmission		
Transmission of verification result for a mismatch (When verification NG)	Disable	√	
	Enable code data transmission		
	Enable OK transmission		
Verification retry after fail judgment in 2-point verification	Enable		
	Disable	√	
Verification range	Code type + code data	√	
	Code data only		
Code type in data editing	Selectable from codes available	Any code (Note 1)	Section 6.2
Transmit data regardless of the results	Enable		
	Disable	√	
Data extraction mode	Data string extraction mode	√	
	Extraction block mode		
	AI mode		
Data string extraction mode - Start position	First position		
	Last position		
	Specified position	√	
Data string extraction mode - End position	Last character	√	
	Specified digits		
	Specified position		
Data string extraction mode - Specified position for extraction start position	0001 to 9999 positions (Specify with ASCII characters)	1	
Data string extraction mode - Specified position for extraction last position	0001 to 9999 positions (Specify with ASCII characters)	9999	
Extraction block mode - Extraction block number (Maximum 3 blocks)	01 to 99 positions (Specify with ASCII characters)	Not specified.	

(Note 1)Selecting "Any code" edits all types of codes.

: Can be changed only with the configuration software.

Items	Parameters	Defaults	Refer to:
Search string and substitution string in data substitution mode	Max. 16 ASCII characters	No specified.	Section 6.2
Number of splits in data blocksorting mode	2 to 5 splits	2	
Split position in data blocksorting mode	0001 to 9999 positions, specified by ASCII characters	Single character	
Order of blocks in data blocksorting mode	Blocks 1 to 5	Block 1/ Block 2	
AI mode	AI split mode	√	
	AI parenthesis mode		
AI split mode - Availability of AI #1	Enable	√	
	Disable		
AI split mode - Availability of AI #2	Enable		
	Disable	√	
AI split mode - Availability of AI #3	Enable		
	Disable	√	
AI split mode - AI #1	Selectable from AI candidates (Note 2)	00	
AI split mode - AI #2	Selectable from AI candidates (Note 2)	00	
AI split mode - AI #3	Selectable from AI candidates (Note 2)	00	
AI split mode - Delimiter	Header/Terminator	√	
	Comma		
	Tab (09h)		

(Note 2) For details about AI candidates, refer to Chapter 6, Section 6.2.1.3, "(3) AI table."

: Can be changed only with the configuration software.

(9) Switching to sleep mode for power saving and auto power-off

Items	Parameters	Defaults	Refer to:
Switching to sleep mode for power saving	After 30 seconds (Ordinary current mode)		Section 3.2
	Immediately (Power saving mode)	√	
Power save mode (Auto sense mode)	Disable	√	
	Short ~ Long		
Auto power-off	5 to 640 minutes	485 min.	Section 3.2
	Disable		

: Can be changed only with the configuration software.

Chapter 12 QR-Coded Parameter Menu

12.1 Customizing the Scanner with the QR-Coded Parameter Menu

Start setting	Use the scanner to read the "Start setting" QR Code symbol. **Note:** Setting the "Beeper volume" does not require this step; however, it requires enabling the Bluetooth® interface with the "Start operation" QR Code symbol.
↓ Three beeps	
Scan parameter setting QR Code symbols.	If the Bluetooth® interface is disabled with the "End operation" QR Code symbol, scan the "Start operation" QR Code symbol to enable the interface. Scan necessary parameter setting QR Code symbols.
↓	
End setting	Scan the "End setting" QR Code symbol.
Three beeps	

Scanning the "All defaults" QR Code symbol from the QR-coded parameter menu makes all items in the menu revert to the factory defaults.

TIP: "Beeper volume" QR Code symbol in the QR-coded parameter menu

The beeper volume can be set even if the above procedure is omitted. No "Start setting" or "End setting" QR Code symbol is required to be scanned.

Each time the "Beeper volume" QR Code symbol is scanned, the beeper volume cycles through High, Medium and Low. The factory default is High.

12.2 QR-coded Parameter Menu

To set the parameters, simply scan the QR codes below. Scanning "Start setting" QR Code symbol and "End setting" QR Code symbol is not required.

Easy connection setup
To set the connection corresponding to the connected device, simply scan the QR Codes below.

(Connected device should be equipped with Bluetooth® module that is compatible with Bluetooth® Specification Ver. 2.1+EDR.)

Windows PC
(SPP,HID Profile with PINCODE)

Windows PC
(SPP,HID Profile without PINCODE)

Android
(HID Profile)

Android
(SPP Profile)

iOS(iPhone , iPad)
(HID Profile)

The beeper volume can be set by scanning the following QR Code symbol only. No "Start setting" or "End setting" QR Code symbol required to be scanned.

Adjusting the beeper volume

Scanning this QR Code symbol cycles the beeper volume through High, Medium and Low. The factory default is High.

Beeper volume

■ **Menu control (Starting/Ending the Setting Procedure and Reverting to Defaults)**

Start setting

Start setting
(When the "White code on black background" is set)"

Cancel

All defaults

End setting

■ Bluetooth® interface and link

Enabling/disabling Bluetooth® interface and breaking the Bluetooth® wireless link

Start operation (default)

End operation

Break Bluetooth® wireless link

Scanning with Bluetooth® wireless link broken

Scanning the "Scan w/ Bluetooth® link broken" QR Code symbol allows the scanner to scan codes with the Bluetooth® wireless link being broken. With this setting selected, data transfer with the host computer is impossible.

"Scan w/ Bluetooth® link broken"

Cancel "Scan w/ Bluetooth® link broken" (default)

Configuring the scanner as slave

Scanning the following QR Code symbol configures the scanner as a slave.

Configure as slave (default)

Start pairing

Scanning the following QR Code symbol starts Pairing.

Start pairing(default)

■ Bluetooth® wireless communications parameters

Procedure

Non-acknowledge mode (default)

ACK/NAK mode

Header (SPP Profile)

None (default)

STX

Header (HID Profile)

None (default)

TAB

Enter

Terminator (SPP Profile)

None

ETX

CR(default)

LF

CR LF

Terminator (HID Profile)

None

TAB

Enter(default)

CR

LF

CR+LF

Timeout period for slave to wait for a connection request

2 minutes (default)

4 minutes

10 minutes

30 minutes

■ Data transmission format

Transmission of code ID mark

Disable (default)

Enable

Transmission of the number of digits

Disable (default)

Enable in 2 digits

Enable in 4 digits

Transmission of BCC

Disable (default)

Enable

■ **2D codes, mirror image and black-and-white inverted codes**

Scanning MicroQR Code

Disable

Enable (default)

Scanning black-and-white inverted codes

Black cells/bars on a white background (default)

White cells/bars on a black background

Automatically identify black and white inverted codes

Scanning split QR Code ("Structured Append")

Edit mode (default)

Non-edit mode

Batch edit mode

Scanning PDF417

Disable

Enable (default)

Scanning MaxiCode

Disable

Enable (default)

Scanning Data Matrix

Disable

Enable (default)

■ **Bar codes**

Scanning UPC-A, UPC-E, EAN-13 and EAN-8

Disable

Enable (default)

Scanning Interleaved 2of5

Disable

Enable with a check digit
(Check digit transmission
disabled)

Enable without
a check digit (default)

Enable with a check digit
(Check digit transmission
enabled)

Scanning Code 128 (EAN-128 (GS1-128))

Disable

Enable (default)

Scanning Codabar (NW-7)

Disable

Enable without a check digit (default)

Enable with a check digit
(Check digit transmission enabled)

Enable with a check digit
(Check digit transmission disabled)

Transmission of start/stop codes for Codabar (NW-7)

Disable

Enable (default)

Scanning Code 39

Disable

Enable without a check digit (default)

Enable with a check digit
(Check digit transmission enabled)

Enable with a check digit
(Check digit transmission disabled)

Transmission of start/stop codes for Code 39

Disable (default)

Enable

Scanning Code 93

Disable (default)

Enable

Scanning GS1 DataBar (RSS)

Disable (default)

Enable

Scanning Composite

Disable (default)

Enable

■ **Other settings**

Trigger switch control

Auto-off mode (default)

Alternate switching mode

Momentary switching mode

Continuous reading mode 1

Continuous reading mode 2

Auto sensing mode

Beeper control

Disable

Enable (default)

Indicator LED

Disable

Enable (default)

Power save mode

Disable

Enable (default)

Chapter 13 QR-Coded Parameter Menu for Communications Adapters (BA11/10-RKU)

13.1 Customizing the Communications Adapter from the Scanner

The scanner can customize the communications adapter by scanning the QR-coded parameter menu for communications adapters and transferring their settings held in the scanner memory via the Bluetooth® wireless link using the following procedure.

Scanner

Store the communications adapter parameter settings in the scanner memory.

Use the scanner to scan the QR-coded parameter menu designed for communications adapters (Section 13.2) to store their parameter settings into the scanner memory.

Tip: Using the configuration software (ScannerSetting_2D) designed for scanners also allows parameter settings for communications adapters. It, however, requires connecting the adapter via a USB-COM or RS-232C interface to the host computer. For details, refer to the "Communications Adapter User's Manual."

↓

Communications adapter

Power the communications adapter.

Power the communications adapter.

Note: Any type of interfaces that power the communications adapter can be used, regardless of the interface setting made in the adapter. For the interfacing procedure, refer to the "Communications Adapter User's Manual," Chapter 2.

↓

Communications adapter

Switch to the setup mode.

Hold down the SETUP button provided on the bottom of the communications adapter for at least 0.5 second with a pin or the like to switch to the setup mode.

Note: Leaving the communications adapter for 3 minutes or more after depression of the SETUP button automatically exits the setup mode.

↓ Communications adapter Interface/power supply LED: Flashes in orange
Bluetooth® status display LED (blue): Flashes slowly

(The communications adapter, as a slave, is waiting for a master to connect.)

Scanner

Establish the Bluetooth® wireless link.

Use the scanner holding communications adapter parameter settings to scan the bar code printed on the bottom of the communications adapter.

↓ Scanner's indicator LED: Flashes in blue

(The scanner beeps three times and initiates a Bluetooth® wireless link, as a master.)

Scanner → Communications adapter

Transfer the communications adapter parameter settings.

After establishment of the Bluetooth® wireless link, the scanner inquires of the communications adapter about the current status and transfers the communications adapter parameter settings stored in the memory.

Note: If the scanner cannot receive an acknowledge response from the communications adapter, it cancels the parameter setting sequence. Both the scanner and communications adapter automatically return to standby for initiation of a Bluetooth® wireless link.

↓ Scanner Indicator LED: Lights in green
Communications adapter Bluetooth® status display LED (blue): Flashes rapidly

End of transfer

After normal end of transfer of parameter settings, the scanner's indicator LED turns blue with one beep.

If the parameter transfer does not end normally, the scanner's indicator LED turns red with three beeps.

Both the scanner and communications adapter automatically reset themselves regardless of whether the parameter transfer ends normally.

Communications adapter Interface/power supply LED: Lights in green

(Both the scanner and communications adapter switch to standby for initiation of a Bluetooth® wireless link.)

13.2 QR-Coded Parameter Menu for Communications Adapters

■ **Menu control (Starting/Ending the Setting Procedure and Reverting to Defaults)**

Start setting

Start setting
(When the "White code on black background" is set)

Cancel

All defaults

End setting

■ **Interface**

USB keyboard interface (default)

RS-232C interface

USB-COM interface

■ **Communications parameters for USB-COM interface**

Monitoring CTS (USB-COM interface)

Disable

Enable (default)

■ **Communications parameters for RS-232C interface**

Transmission speed (RS-232C interface)

1200 bps

2400 bps

4800 bps

9600 bps (default)

14400 bps

19200 bps

38400 bps

57600 bps

115200 bps

Data bit (RS-232C interface)

7 bits

8 bits (default)

Parity (RS-232C interface)

None (default)

EVEN

ODD

Stop bit (RS-232C interface)

1 bit (default)

2 bits

Monitoring CTS (RS-232C interface)

Disable

Enable (default)

■ Specifying communications parameters for the USB keyboard interface

Specifying the keyboard type with USB keyboard interface

U.S. English

German

French

U.K. English

Italian

(default)
＜Japan＞

Swedish

※Above default is BA11-RKU.In case of BA10-RKU, default is U.S.English.

Chapter 14 Troubleshooting

Problem 1: Low reading efficiency.

Probable cause	What to do:
• A target code is not within the scan range of the reading window.	• Bring a code within the scan range.
• The code may be smeared.	• Wipe off the dirt from the code.
• The code may be blurred.	• Use a code clearly printed.

Problem 2: Cannot read 2D codes or bar codes.

Probable cause	What to do:
• The type of the code to be scanned has not been set as a readable code.	• Enable the type of the code to be scanned as a readable code.
• The scanned bar code contains no check digit, while the "Enable, with a check digit" parameter is selected.	• Select the "Enable, without a check digit" parameter.
• The check digit contained in the scanned bar code is wrong.	• Use a correct bar code.

Problem 3: Code data not displayed on the computer screen correctly.

Probable cause	What to do:
• The target Bluetooth® device is not ready for communication.	• Refer to the user's manual of the target Bluetooth® device.
• The target Bluetooth® device is located too far from your scanner.	• Bring the target Bluetooth® device and your scanner close to each other.
• The Bluetooth® wireless link with the target Bluetooth® device is not established.	• Establish the Bluetooth® wireless link with the target Bluetooth® device.
• The "Scanning w/ Bluetooth® wireless link broken" is selected.	• Cancel the setting. (See Chapter 3.)

Problem 4: Scanner's operation period too short even after recharge.

Probable cause	What to do:
• The scanner may not be placed in the charger properly.	• Place the scanner in the charger properly. (See Section 9.1.)

Problem 5: Bluetooth® wireless link unexpectedly broken

Probable cause	What to do:
• The automatic disconnection may be enabled.	• Press the trigger switch to reestablish the Bluetooth® wireless link. • Change the timeout period for scanner to wait for a connection request if necessary. (See Section 8.1.)

Appendix 1 Specifications

Item			AT27Q-SB
Scanning specifications	Readable codes		QR Code (Model 1 and Model 2), MicroQR, SQRC (*1), iQR, PDF417, MicroPDF417, MaxiCode, Data Matrix, Aztec, and EAN.UCC Composite symbol EAN-13/8, UPC-A/E, UPC/EAN with add-on, Interleaved 2of5 (ITF), Standard 2of5 (STF), Code 39, Codabar (NW-7), Code 93, Code 128, GS1-128 (EAN-128), and GS1 DataBar (RSS)
	Skew angle		360º
	Scanning resolution		0.167 mm (6.6 mils) min. for two-dimensional codes 0.125 mm (4.9 mils) min. for bar codes
	Elevation angle (skew)		±50°
	Tilt angle (pitch)		±50°
	Light source		LED (red)
	Reading confirmation		Blue LED, and beeper
Interface	Bluetooth®		Built-in Bluetooth® wireless device compliant with Bluetooth® Specification Ver. 2.1+EDR
		Profile(s) supported	SPP (Serial Port Profile) HID (Human Interface Device Profile)
Input power requirements	Main power		Li-ion battery cartridge
	Operating voltage range		3.7 V DC
Operating time			28 hours (if code scanning is repeated every 5 seconds)
Environmental conditions	Operating temperature range		-5 to 50°C
	Operating humidity range		10 to 90% RH (*2)
	Storage temperature range		-10 to 60°C
	Storage humidity range		5 to 95% RH (*2)
	Ambient illuminance range		Max. 10,000 lux
Dimensions (W) x (D) x (H)			63 x 95 x 163 mm (2.5 x 3.7 x 6.4 inches)
Weight			Approx. 200 g

(*1) To use SQRC, contact your Denso Wave representative.

(*2) Sharp temperature change, dewing or freezing not allowed, wet-bulb temperature 30°C max.

Appendix 2 Control Commands

Control commands refer to commands that are exchanged between the host computer and the scanner via the communications line.

Some of the control commands that the host computer issues are functionally equivalent to some parameters that can be set with the QR-coded parameter menu (refer to Chapter 11). Control command settings have priority over settings made with the QR-coded parameter menu.

Note that turning off the scanner will clear control command settings so that settings made with the QR-coded parameter menu will take effect unless the PW command is sent to the scanner for saving control command settings into the FLASH ROM.

If commands other than ones listed below are sent to the scanner, the scanner operation is not assured.

Note: Until the completion of execution of a specified control command, the subsequent command will not be executed.

Control Commands	Transfer Direction Scanner ⟷ Host	Function
Z (Note 1) (Note 2)	←	Switch to standby Upon receipt of the Z, READOFF or LOFF command, the scanner switches to standby as long as the trigger switch control is set to continuous reading mode 1 or 2.
READOFF	←	
LOFF	←	
R (Note 1)	←	Ready to scan Upon receipt of the R, READON or LON command, the scanner becomes ready to scan as long as the trigger switch control is set to continuous reading mode 1 or 2.
READON	←	
LON	←	
B1 B2 B3 (Note 3) (Note 4)	←	Sound the beeper Within 100 ms from the receipt of any of B1, B2 and B3 commands, the scanner beeps for the period specified below. B1: Beep for approx. 60, 80 or 120 ms once. Beeps for approx. 70 ms twice. B2: Beep for approx. 120 ms B3: Beep for approx. 240 ms Even if the beeping is prohibited or the scanner is on standby, the beeper will be able to sound.
BH1, BM1, BL1 BH2, BM2, BL2 BH3, BM3, BL3 (Note 3) (Note 4)	←	Specifies the beeper tone. Adding this command to B1, B2 and B3 commands allows the scanner to beep at the specified frequency. H: High (2.9 kHz) M: Medium (2.7 kHz) L: Low (2.5 kHz)
LB (Note 3)	←	Light the blue indicator LED Within 100 ms from the receipt of the LB command, the blue indicator LED lights for approx. 500 ms.
LG (Note 3)	←	Light the green indicator LED Within 100 ms from the receipt of the LG command, the green indicator LED lights for approx. 500 ms.

Control Commands	Transfer Direction Scanner ⟷ Host	Function
LR (Note 3)	←	Light the red indicator LED Within 100 ms from the receipt of the LR command, the red indicator LED lights for approx. 500 ms.
IMAGEOUT	←	Capture image Refer to Chapter 10 for details.
U1 U2 U3 U4 U5 U6 U7 U8	←	Trigger switch control U1: Auto-off mode U2: Momentary switching mode U3: Alternate switching mode U4: Continuous reading mode 1 U5: Continuous reading mode 2 U6: Auto sensing mode U7: Auto stand mode U8: Momentary switching mode (Reverse type)
PW (Note 5)	←	Save parameters This command saves settings made with U1 through U7 commands into the EEPROM. Without the PW command, the scanner will lose settings made with U1 through U7 when it is turned off.
VER	←	Request for software version <Response from the scanner> Ver.n.nn where n.nn is version number (Ex. Ver.1.00)
VERF	←	Request for the parameter setting version This command checks the version of the parameter settings made in the scanner when the scanner is linked with the configuration software (ScannerSetting_2D). <Response from the scanner> Ver.n.nn.mm where n.nn.mm is version number (Ex. Ver.1.00.00) and mm is parameter setting version.
E	←	Request for scan entry mode In scan master registration for n-point verification, switching the scanner to the data verification mode, sending a scan entry control command "E" from the host, and scanning a master code with the scanner registers the master data which is saved in the FLASH ROM.
ID	←	Request for scanner ID (serial number) <Response from the scanner> ID.nnnnnn where nnnnnn is a serial number (Ex. ID.000001)
TMON (Note 6)	←	Enable trigger switch It enables the trigger switch control.
TMOFF (Note 6)	←	Disable trigger switch It disables the trigger switch control and switches the scanner standby.
ERROR	→	Scanning failure When the scanner (which is ready to scan) cannot complete scanning and switches to standby, it sends the ERROR command as long as the trigger switch control is set to continuous reading mode 1 or 2. Whether or not to send this command can be selected.

Control Commands	Transfer Direction Scanner ⟷ Host	Function
OK	→	Verification match If code data scanned matches master data in data verification mode, the scanner sends this command as long as the OK transmission is enabled for a match.
NG	→	Verification mismatch If code data scanned does not match master data in data verification mode, the scanner sends this command as long as the NG transmission is enabled for a mismatch.

(Note 1) If the scanner receives the R command twice with the reading window being applied to a code (for example, it receives the R command, sends the code data read, and receives the Z and R commands), it will send even the same code data twice. This is because the Z command cancels the duplication prevention processing.

In split QR Code scanning operation, if the scanner receives the Z command and switches to standby before scanning a set of split QR Code symbols, the duplication prevention processing will be canceled. The code data that has been read halfway will be discarded.

The READOFF and LOFF commands produce the same result as the Z command, the READON and LON commands, as the R command.

(Note 2) When the scanner is on standby, pressing the trigger switch may light the LEDs momentarily, but the scanner cannot scan codes.

(Note 3) After receipt of one of the B1 to B3, BH1 to BH3, BM1 to BM3, BL1 to BL3, LB, LG and LR command, the scanner may need a maximum of 100 ms to execute the command.

(Note 4) Beeping specified by control commands B1, BH1, BM1, and BL1 is dependent on the reading completion sound and its length.

(Note 5) The PW can save settings into the FLASH ROM a maximum of 1,000,000 times due to the restrictions on the EEPROM.

(Note 6) These control commands are available only when the scanner is not in data verification mode

Appendix 3 Bluetooth® Glossary

The table below lists Bluetooth® terms used in this manual.

Bluetooth® Address (BD_ADDR)	Bluetooth® Device Address. Each Bluetooth® equipment is allocated a unique 48-bit device address defined by the Bluetooth® SIG.
Bluetooth® Passkey (PIN)	Bluetooth® Personal Identification Number. This is a maximum of 16 bytes of passkey used to authenticate two Bluetooth® devices in pairing. Once authentication is performed, no Bluetooth® passkey input is required for the next authentication.
Local Name	Bluetooth® Device Name. This is a user-friendly name for the Bluetooth® Device to identify itself.
Bluetooth® Wireless Link	Wireless communications line connecting the master and slave devices.
Master	Master device that initiates and requests operations and controls slave devices.
Slave	Slave device that is network-controlled by the master device in Bluetooth® wireless communication.

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2D Code Handy Scanner

AT27Q-SB

User's Manual

Second Edition, December 2013

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